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United States
Department of
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Food Safety
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Science and
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Evaluation
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Compound Evaluation and Residue Information 1994

United States
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Compound Evaluation and Residue Information

**Food Safety and Inspection Service
Science and Technology Program**

**Chemistry
Division**

**Evaluation
Branch**

**300 12th Street, S.W.
Washington, DC 20250**

1994

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PREFACE

This is the "Compound Evaluation and Capability Document." It differs from previous editions in that the National Residue Program Plan will be published as a separate document.

Purpose of Document

The document serves as a reference source for those concerned with food safety and with Food Safety and Inspection Service (FSIS) activities in that area. It details the FSIS activities in evaluation of compounds that may be present in meat and poultry and its development and implementation of analytical methods for detecting these compounds.

National Residue Program

As part of its National Residue Program (NRP), the Food Safety and Inspection Service collects samples of domestic and imported meat and poultry at slaughtering establishments and at Ports of Entry under its inspection authority. The samples are analyzed for the presence of unacceptable residue concentrations of pesticides, animal drugs, and other potentially hazardous chemicals that may contaminate meat and poultry. These activities are carried out as part of the Agency's responsibilities under the Federal Meat Inspection Act and the Poultry Products Inspection Act to ensure that USDA-inspected products in commerce are safe, wholesome, and free of adulterating chemical residues.

Compounds are included in the NRP monitoring plan according to certain guidelines. A compound initially included in the NRP Monitoring Plan must leave detectable residue(s) in meat and poultry, and have an established tolerance, action level, or other regulatory limit. It should be ranked in the FSIS Compound Evaluation System (CES). The description of the CES is available from the Agency and is described in detail in the FSIS publication "The Compound Evaluation System", Second Edition, Revised 1991" developed by Residue Evaluation and Planning Division. In addition, FSIS laboratories must possess a suitable regulatory method, capable of confirming the identity and quantity of the residue. Compounds may be included due to other factors such as international trade implications or environmental issues.

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SUMMARY OF DOCUMENT

SECTION 1

Section 1 is a list of tolerances and action levels for compounds as given in the Code of Federal Regulations (CFR) by FDA and EPA.

SECTION 2

Section 2 includes "Criteria for Compound Evaluation," which describes the procedure followed by FSIS in evaluating compounds for inclusion in the National Residue Program (NRP) and the "List of Compounds Ranked."

SECTION 3

Section 3 includes a list of historical compounds considered for possible inclusion in the NRP and a table of compounds included in the program from 1972 to 1994. The historical list was compiled by consulting the separate entries in the (CFR), the New Animal Drug Application (NADA) listing of the Food and Drug Administration, and the Federal Register (FR). The list provides the compound name, the residue designation denoting the compound class and appropriate CFR, NADA, or FR references. NADA references are used for approved animal drugs not listed in the CFR.

SECTION 4

Section 4 defines the criteria for methods used by FSIS to conduct analyses and their suitability for regulatory use, defines key terms used to describe the methods, and lists the analytical methods for compounds in alphabetical order.

Section 1

Residue Limits

1. *Introduction*
2. *Methodology*

1994 RESIDUE LIMITS

INTRODUCTION

This section provides information on residue limits of potential contaminants in meat and poultry products applied by FSIS (as of July 1, 1993). These limits include tolerances and action levels developed by the Environmental Protection Agency (EPA) for pesticide chemicals, by the Food and Drug Administration (FDA) for animal drugs and unavoidable contaminants. These limits are derived in most cases from the Code of Federal Regulations (CFR): pesticide limits from 40 CFR 180, those for animal drugs from 21 CFR 556, and unavoidable contaminants from 21 CFR 109. The approved use conditions for animal drugs can be found in 21 CFR 520, 522, 524, 526, 529 (new animal drugs not subject to certification), 540, 544, 546, 548 (antibiotic drugs for use with animals), and 558 (new animal drugs for use in animal feed). This document includes the relevant citations.

Formal tolerances are not established in all cases. For example, tolerance exemptions have been granted by FDA and EPA in approving the use of some pesticides and new animal drugs. For some unavoidable contamination situations, FDA and EPA, upon request, recommend action levels to FSIS; however, tolerances or action levels have not been established for all such situations. FSIS does not permit concentrations of residues in meat and poultry that exceed the residue limits published in this section.

The residue limits for poultry and livestock species are listed alphabetically by compound (which may include a compound's metabolites). The entries include, among other things, CFR or Federal Register (FR) citations for tolerance, and notations of action levels. Entries for animal drugs with "zero" or "no- residue" tolerances are also included, in parenthesis, the limits of quantification considered by FDA in approving those drugs in food-producing animals. These limits are used by FDA for enforcement purposes, and are applied by FSIS in determining if product is adulterated.

Any residue of a new animal drug found in the edible tissues of a species for which the drug is not approved will be considered an adulterant. A concentration of a substance endogenous to the animal tissue in question would not be considered an adulterant.

Unless otherwise indicated, "meat by-products" includes kidney and liver.

KEY TO TISSUES

EK:Excluding kidneys

Et:Edible tissue

F:Fat

K:Kidney

L:Liver

M:Muscle

MB;meat byproducts

S:Skin

Sf:Skin with fat

Sm:Skeletal muscle

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Acephate & metabolite	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 01M 0.1Mb	40 CFR 180.108
2-Acetyl-amino-5-nitrothiazole	-	-	-	-	0.1Et ¹	21 CFR 556.20
Acifluorfen & metabolites	0.02K 0.02L 0.02Mb	0.02K 0.02L	0.02K 0.02L	0.02F 0.02M	0.02K 0.02L	40 CFR 180.383
Aklomide & metabolite	-	-	-	4.5L ² 4.5M ² 3.0Sf ²	-	21 CFR 556.30
Alachlor & metabolites	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.249
Albendazole	0.2L ³	-	-	-	-	21 CFR 556.34
Aldicarb & metabolites	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	-	0.01F 0.01M 0.01Mb	40 CFR 180.269
Aldrin	0.3F ⁴	0.3F ⁴	0.3F ⁴	0.3F ⁴	0.3F ⁴	51 FR 46662
Amitraz & metabolites	0.1F 0.05M	0F 0M	0.1F 0.05M 0.2K 0.2L	-	0F 0M	40 CFR 180.287 53 FR 18898
Amoxicillin	0.01Et	-	-	-	-	21 CFR 556.38
Ampicillin	0.01Et	-	0.01Et	-	-	21 CFR 556.40

1 Turkeys only.

2 Chickens only.

3 Tolerance for marker residue the 2-aminosulfone.

4 Action Level.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
units are parts per million						
Amprolium	2.0F ¹ 0.5K ¹ 0.5L ¹ 0.5M ¹	-	-	1K ² 1L ² 0.5M ²	-	21 CFR 556.50
Apramycin	-	-	0.4F ³ 0.4K ³ 0.3L ³ 0.1M ³		-	21 CFR 556.52
Arsenic	-	-	2K 2L 0.5M 0.5Mb	0.5M 2Mb	-	21 CFR 556.60
Arsenite (sodium) (as As ₂ O ₃)	0.7F 2.7K 2.7L 0.7M 0.7Mb	-	-		0.7F 2.7K 2.7L 0.7M 0.7Mb	40 CFR 180.335
Atrazine	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02F 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.220
Avermectin ⁴	0.02M 0.02Mb	- -	- -	- -	- -	40 CFR 180.449 54 FR 31836
Bacitracin	0.5Et	-	0.5Et	0.5Et ⁵	-	21 CFR 556.70
Benomyl & metabolites	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	01F 0.2L 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.294
Bentazon & metabolite	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	40 CFR 180.355

1 Calves only.
2 Chickens and turkeys.
3 Total residues.
4 Tolerances (for residues resulting from use as a pesticide)
established until March 31, 1993.
5 Also, pheasants and quail.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY parts per million	HORSES	REFERENCE
Benzene Hexachloride	0.3F ¹	0.3F ¹	0.3F ¹	0.3F ¹	0.3F ¹	51 FR 25697
Bifenthrin²	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.442
Bromoxynil	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.324
Buquinolate	-	-	-	0.4K ³ 0.4L ³ 0.1M ³ 0.4Sf ³	-	21 CFR 556.90
sec-Butylamine	0.75F 3.0K 0.75M 0.75Mb	-	-	-	-	40 CFR 180.321
Cacodylic Acid (as As₂O₃)	0.7F 1.4K 1.4L 0.7M 0.7Mb	-	-	-	-	40 CFR 180.311
Captan	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	-	-	40 CFR 180.103
Carbadox & metabolite	-	-	0(0.03)Et	-	-	21 CFR 556.100

1 Action level.

2 Tolerances established until 1994.

3 Chickens only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Carbaryl & metabolites	0.1F 1.0K 1.0L 0.1M 0.1Mb	0.1F 1.0K 1.0L 0.1M 0.1Mb	0.1F 1.0K 1.0L 0.1M 0.1Mb	5F 5M	0.1F 1.0K 1.0L 0.1M 0.1Mb	40 CFR 180.169
Carbofuran & metabolites¹	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.254
Carbomycin	-	-	-	0(0.5)Et ¹	-	21 CFR 556.110
Carbopheno- thion	0.1F	0.1F	0.1F	-	-	40 CFR 180.156
Carboxin & metabolite	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.301
Ceftiofur	₃	-	-	-	-	21 CFR 556.113
Cephapirin	0.1Et	-	-	-	-	21 CFR 556.115
Chlordane	0.3F ⁴	0.3F ⁴	0.3F ⁴	0.3F ⁴	0.3F ⁴	51 FR 46665
Chlordimeform	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.25F 0.25M 0.25Mb	0.1F 0.1M 0.1Mb	40 CFR 180.285
Chlorhexidine	0(0.001)Et ⁵	-	-	-	-	21 CFR 556.120

1 No more than 0.02 can be carbamates.

2 Chickens only.

3 Tolerance for marker residue not needed.

4 Action level; includes sum of residues of cis- and trans-chlordane, cis-and trans-nonachlor, oxychlordane (octachlor expoxide), and alpha, beta, and gamma chlordene.

5 Calves only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
2-Chloro-1-(2,4-dichlorophenyl) vinyl diethyl phosphate [Chlorfenvinphos]	0.2F	0.2F ¹	0.005F	0.005F	0.005F	40 CFR 180.322
2-Chloro-N-isopropylacetanilide [Propachlor]	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.211
Chloroneb & metabolite	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	-	0.2F 0.2M 0.2Mb	40 CFR 180.257
Beta-(4-Chlorophenoxy)-alpha-(1,1-dimethylethyl)-1-H-1,2,4-triazole-1-ethanol [Triadimenol]	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.01F 0.01M 0.01Mb	0.1F 0.1M 0.1Mb	40 CFR 180.450
1-(4-Chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)-2-butanone & metabolites [Triadimefon]	1.0F 1.0M 1.0Mb	1.0F 1.0M 1.0Mb	0.04F 0.04M 0.04Mb	0.04F 0.04M 0.04Mb	1.0F 0.0M 1.0Mb	40 CFR 180.410
2-(m-Chlorophenoxy) propionic acid	0.05F 0.50K 0.05M 0.05Mb	0.05F 0.50K 0.05M 0.05Mb	0.05F 0.50K 0.05M 0.05Mb	0.05F - 0.05M 0.05Mb	0.05F 0.50K 0.05M 0.05Mb	40 CFR 180.325
2-Chloro-1-(2,3,5-trichlorophenyl) vinyl dimethyl phosphate [Stirafos, Tetrachlorvinphos]	1.5F	0.5F	1.5F	0.75F	0.5F	40 CFR 180.252
Chlorpyrifos & metabolite	2.0F 2.0M 2.0Mb	1.0F 1.0M 1.0Mb	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	1.0F 1.0M 1.0Mb	40 CFR 180.342

1 Sheep only; goats 0.005F.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Chlorpyrifos-methyl and metabolite	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	40 CFR 180.419
Chlorsulfuron	0.3F 0.3M 0.3Mb	0.3F 0.3M 0.3Mb	0.3F 0.3M 0.3Mb	-	0.3F 0.3M 0.3Mb	40 CFR 180.405
Chlortetracycline	0F ¹ 0.1K ¹ 0.1L ¹ 0.1M ¹	- 1K ² 0.5L ² 0.1M ²	0.2F 4K 2L 1M	1F 4K 1L 1M,1S	-	21 CFR 556.150
Clethodim³	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	57 FR 3296
Clofentezine & metabolite⁴	0.05F 0.4L 0.05M 0.05Mb	0.05F 0.4L 0.05M 0.05Mb	0.05F 0.4L 0.05M 0.05Mb	-	0.05F 0.4L 0.05M 0.05Mb	56 FR 22333
Clopidol	3K 1.5L 0.2M	3K 1.5L 0.2M	0.2Et	15K 15L 5M	-	21 CFR 556.160
Clopyralid	1.0F 12.0K 1.0M 1.0Mb	1.0F 12.0K 1.0M 1.0Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	1.0F 12.0K 1.0M 1.0Mb	40 CFR 180.431
Clorsulon	1.0K ⁵	-	-	-	-	21 CFR 556.163
Cloxacillin	0.01Et	-	-	-	-	21 CFR 556.165

1 Cattle only; calves 1F,4K,4L,1M.

2 Sheep only.

3 Tolerances expire January 31, 1994.

4 Tolerances expire September 3, 1994.

5 Tolerance for clorsulon corresponds to 3.0 pm total residues in kidney.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY parts per million	HORSES	REFERENCE
Coumaphos & oxygen analog	1F 1M 1Mb	1F 1M 1Mb	1F 1M 1Mb	1F 1M 1Mb	1F 1M 1Mb	40 CFR 180.189
Cruformate & metabolite	1F 1M	1F 1M	-	-	-	40 CFR 180.295
Cyano (3-phenoxy -phenyl)methyl-4- chloro-a-(methyl- ethyl)benzene acetate[Fenvalerate]	1.5F 1.5M 1.5Mb	1.5F 1.5M 1.5Mb	1.5F 1.5M 1.5Mb	1.5F 1.5M 1.5Mb	1.5F 1.5M 1.5Mb	40 CFR 180.379
Cyfluthrin	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.436
Cyhalothrin	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	-	0.01F 0.01M 0.01Mb	40 CFR 180.438 57 FR 32440
Cyhexatin & metabolites	0.2F 0.5K 0.5L 0.2M 0.2Mb	0.2F 0.5K 0.5L 0.2M 0.2Mb	0.2F 0.5K 0.5L 0.2M 0.2Mb	-	0.2F 0.5K 0.5L 0.2M 0.2Mb	40 CFR 180.144
Cypermethrin¹	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.418
Cyromazine	-	-		0.05F ² 0.05M ² 0.05Mb ²	-	40 CFR 180.414

1 Tolerance established until July 1, 1993.

2 Chicken layer hens & breeder hens, tolerance for parent cyromazine; an additional tolerance of 0.005F, M, Mb exists for the metabolite, melamine.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
2,4-D & metabolite	0.2F 2K 0.2M 0.2Mb	0.2F 2K 0.2M 0.2Mb	0.2F 2K 0.2M 0.2Mb	0.05F 0.05K 0.05M 0.5Mb	0.2F 2K 0.2M 0.2Mb	40 CFR 180.142
Dalapon	0.2M 0.2Mb	0.2M 0.2Mb	0.2M 0.2Mb	3Ek 9K	-	40 CFR 180.150
DDT & metabolites	5F ¹	5F	5F ¹	5F ¹	5F ¹	51 FR 46658
Decoquate	2Et 1Sm	2Et ² 1Sm ²	-	2Et ³ 1Sm ³	-	21 CFR 556.170
Dialifor & oxygen analog	0.15F 0.15M 0.15Mb	0.15F 0.15M 0.15Mb	-	0.05F 0.05M 0.05Mb	-	40 CFR 180.326
Diazinon	0.7F 0.7M 0.7Mb	0.7F ⁴ 0.7M ⁴ 0.7Mb ⁴	-	-	-	40 CFR 180.153
Dicamba & metabolite	0.2F 1.5K 1.5L 0.2M 0.2Mb	0.2F 1.5K 1.5L 0.2M 0.2Mb	0.2F 1.5K 1.5L 0.2M 0.2Mb	-	0.2F 1.5K 1.5L 0.2M 0.2Mb	40 CFR 180.227
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl) benzamide & metabolites [Pronamide]	0.02F 0.2K 0.2L 0.02M 0.02Mb	0.02F 0.2K 0.2L 0.02M 0.02Mb	0.02F 0.2K 0.2L 0.02M 0.02Mb	0.02F 0.2K 0.2L 0.02M 0.02Mb	0.02F 0.2K 0.2L 0.02M 0.02Mb	40 CFR 180.317

- 1 Action level.
- 2 Goats only.
- 3 Chickens only.
- 4 Sheep only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
1,1-Dichloro-2,2-bis(p-ethylphenyl)ethane[Perthane]	0.0M	0.0M	0.0M	0.0M	0.0M	40 CFR 180.139
1-({2-(2,4-Dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1-H-1,2,4 triazole & metabolites [Propiconazole]	0.1F 2.0K ¹ 2.0L ¹ 0.1M 0.1Mb	0.1F 2.0K ¹ 2.0L ¹ 0.1M 0.1Mb	0.1F 2.0K ¹ 2.0L ¹ 0.1M 0.1Mb	0.1F 0.2K 0.2L 0.1M 0.1Mb	0.1F 2.0K ¹ 2.0L ¹ 0.1M 0.1Mb	40 CFR 180.434
Dichlorvos	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.1F 0.1M 0.2Mb	0.05F 0.05M 0.05Mb	0.02F 0.02M 0.02Mb	40 CFR 180.235 21 CFR 556.180
Dieldrin	0.3F ²	0.3F ²	0.3F ²	0.3F ²	0.3F ²	51 FR 46662
O,O-Diethyl-O-(p-(methylsulfinyl)phenyl)phosphorothioate & metabolites [Fensulfothion]	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	-	0.02F 0.02M 0.02Mb	40 CFR 180.234
Difenzoquat	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.369
Diflubenzuron	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.377
Dihydrostreptomycin	0(0.5)Et ^{3,4}	-	-	-	-	21 CFR 556.200

1 Tolerances established until June 21, 1993.

2 Action level.

3 Calves only.

4 Administrative tolerance in calves and cattle 2.0K.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
units are parts per million						
Dimethipin	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	-	0.02F 0.02M 0.02Mb	40 CFR 180.406
Dimethoate & oxygen analog	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.204
O,O-Dimethyl-S- [(4-oxo-1,2,3- benzotriazin-3 (4H)-yl)methyl] phosphorodithioate [Azinphosmethyl]	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	-	0.1F 0.1M 0.1Mb	40 CFR 180.154
O,O-Dimethyl- O-p(dimethyl- Sulfamoyl) Phenyl phosphorothioate & oxygen analog [Famphur]	0.1F 0.1M 0.1mb	- - -	- - -	- - -	- - -	40 CFR 180.233
Dimethyl phosphate of a- methylbenzyl 3- hydroxy-cis-crotonate [Crotoxyphos]	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	-	-	40 CFR 180.280
N,N-Dimethyl- piperidinium chloride (Mepiquat)	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.384
3,5-Dinitrobenz- amide	-	-	-	0(0.020)Et ¹	-	21 CFR 556.220
Dioxathion	1F	1F	1F	1F	-	40 CFR 180.171
Diphenamid	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.230

¹ Chicken only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Diphenylamine	0M	0M	0M	0M	0M	40 CFR 180.190
Dipropyl isocinchomer- onate	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.143
Diquat	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.226
Diuron	1F 1M 1Mb	1F 1M 1Mb	1F 1M 1Mb	-	1F 1M 1Mb	40 CFR 180.106
Dodecachloro- octa-hydro-1,3, 4-metheno-2H- cyclo-buta(cd) pentalene [Mirex]	0.1F ¹ 0.1M ¹ 0.1Mb ¹	0.1F ¹ 0.01M ¹ 0.1Mb ¹	0.1F ¹ 0.1M ¹ 0.1Mb ¹	0.1F ¹ 0.1M ¹ 0.1Mb ¹	0.1F ¹ 0.1M ¹ 0.1Mb ¹	51 FR 45114
Dodine	0M	0M	0M	0M	0M	40 CFR 180.172
Endosulfan & metabolite	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	- -	0.2F 0.2M 0.2Mb	40 CFR 180.182
Endrin	0.3F ¹	0.3F ¹	0.3F ¹	0.3F ¹	0.3F ¹	MPI Dir 917.1
Erythromycin	0(0.3)Et	-	0.1Et	0.125Et	-	21 CFR 556.230
Estradiol benzoate	480F ² 360K ² 240L ² 120M ²	600F ³ 600K ³ 600L ³ 120M ³	-	-	-	21 CFR 556.240

1 Action levels.

2 Heifers, steers, and calves (ppt); above concentrations naturally present.

3 Lambs only (ppt); above concentrations naturally present.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
			units are parts per million			
Estradiol monopalmitate	-	-	-	0(0.002)Et ¹	-	21 CFR 556.250
Ethalfuralin	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.416
Ethephon	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.300
Ethion & oxygen analog	2.5F 2.5M ² 1.0Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	40 CFR 180.173
Ethofumesate & metabolites	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.345
Ethopabate	-	-	-	1.5K ¹ 1.5L ¹ 0.5M ¹	-	21 CFR 556.260
2-[1-Ethoxy- imino)-butyl]5[2- (ethylthio)- propyl]-3-hydroxy- 2-cyclohexene-1 -one & metabolites [Sethoxydim]	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	40 CFR 180.412 55 FR 6639
Ethoxyquin	5F 0.5M	5F 0.5M	5F 0.5M	3F 3L 0.5M	5F 0.5M	21 CFR 172.140

1 Chickens only.

2 Fat basis only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
units are parts per million						
5-Ethoxy-3-(trichloromethyl)-1,2,4-thiadiazole & metabolite [Etridazole]	0.10F 0.10M 0.10Mb	0.10F 0.10M 0.10Mb	0.10F 0.10M 0.10Mb	0.10F 0.10M 0.10Mb	0.10F 0.10M 0.10Mb	40 CFR 180.370
Ethyl 4,4'-dichlorobenzilate [Chlorobenzilate]	0.5F 0.5M 0.5Mb	0.5F ¹ 0.5M ¹ 0.5Mb	-	-	-	40 CFR 180.109
Ethyl 3-methyl-4-(methylthio)phenyl(1-methyl-ethyl)phosphoramidate [Fenamiphos]	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.349
O-Ethyl-O-[4-(methylthio)phenyl] S-propyl phosphorodithioate & metabolites [Sulprofos]	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.01F 0.01M 0.01Mb	0.1F 0.1M 0.1Mb	40 CFR 180.374
S-[2-(Ethylsulfinyl)-ethyl] O,O-dimethylphosphorodithioate & metabolites [Oxydemeton methyl]	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	-	0.01F 0.01M 0.01Mb	40 CFR 180.330
Fenarimol	0.1F 0.1K 0.1L 0.01M 0.01Mb	0.1F 0.1K 0.1L 0.01M 0.01Mb	0.1F 0.1K 0.1L 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.1F 0.1K 0.1L 0.01M 0.01Mb	40 CFR 180.421

1 Sheep only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Fenbendazole	0.8L ¹	-	5.0M ^{2,3} 20.0K 15.0L 20.0Sf	-	-	21 CFR 556.275
Fenoxaprop- ethyl & metabolites ⁴	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F5 0.05M 0.05Mb	6 FR 42531
Fenprosalene ^{2,3}	0.04F 0.01M 0.03K 0.02L	-	-	-	-	21 CFR 556.277
Fenridazon, potassium salt	0.05F 1.0K 1.0L 0.05M 0.05Mb	0.05F 1.0K 1.0L 0.05M 0.05Mb	0.05F 1.0K 1.0L 0.05M 0.05Mb	0.30F 0.30M 0.30Mb	0.05F 1.0K 1.0L 0.05M 0.05Mb	40 CFR 180.423
Fenthion & metabolites	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	40 CFR 180.214
Fluazifop & butyl ester	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.411
Flucythrinate	1.0F 0.1M 0.1Mb	1.0F 0.1M 0.1Mb	1.0F 0.1M 0.1Mb	-	1.0F 0.1M 0.1Mb	40 CFR 180.400
Fluridone	0.05F 0.1K 0.1L 0.05M 0.05Mb	0.05F 0.1K 0.1L 0.05M 0.05Mb	0.05F 0.1K 0.1L 0.05M 0.05Mb	0.05F 0.01K 0.01L 0.05M 0.05Mb	0.05F 0.1K 0.1L 0.05M 0.05Mb	40 CFR 180.420

1 Tolerance for parent fenbendazole; corresponds to 10 ppm in liver.

2 Tolerance for marker residues not needed.

3 Safe concentrations.

4 Tolerances expire April 12, 1996.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Fluvalinate	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.1M 0.01Mb	0.01F 0.01M 0.01Mb	40 CFR 180.427
Furazolidone	-	-	0(0.100)Et	-		21 CFR 556.290
Gentamicin sulfate	-	-	0.4F 0.4K 0.3L 0.1M	0.1Et ¹		21 CFR 556.300
Glyphosate & metabolite	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	40 CFR 180.364
Halofuginone	-	-	-	0.16L ² 0.10L ^{2A}		21 CFR 556.308 57 FR 21209
Haloxon	0.1Et	-	-	-		21 CFR 556.310
HCB	0.5F ³	0.5F ³	0.5F ³	0.5F ³	0.5F ³	MPI Dir 917.1
Heptachlor & heptachlor epoxide	0.2F ³ 0.2M ³ 0.2Mb ³	0.2F ³ 0.2M ³ 0.2Mb ³	0.2F ³ 0.2M ³ 0.2Mb ³	0.02F ³ 0.2M ³ 0.2Mb ³	0.2F ³ 0.2M ³ 0.2Mb ³	54 FR 33690 MPI Dir 917.1
Hexakis (2-methyl-2-phenylpropyl) distannoxane [Fenbutatin oxide]	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	0.5F 0.5M 0.5Mb	0.1F 0.1M 0.1Mb	0.5F 0.5M 0.5Mb	40 CFR 180.362

1 Turkey only.

2 Broiler chickens and 2A turkeys;
tolerance for parent halofuginone; corresponds
to 0.3 ppm total residues in liver.

3 Action level.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are part per million	POULTRY units are part per million	HORSES	REFERENCE
Hexazinone & metabolite	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.396
Hygromycin B	-	-	0Et (0.9M) (1.4K)	0Et (0.9M) (1.4K)	-	21 CFR 556.330
Imazalil & metabolites [Enilconazole]	0.01F 0.50L 0.01M 0.01Mb	0.01F 0.50L 0.01M 0.01Mb	0.01F 0.50L 0.01M 0.01Mb	-	0.01F 0.50L 0.01M 0.01Mb	40 CFR 180.413
Iprodione & metabolites	0.5F 3.0K 3.0L 0.5M 0.5Mb	0.5F 3.0K 3.0L 0.5M 0.5Mb	0.5F 3.0K 3.0L 0.5M 0.5Mb	3.5F 3.0K 5.0L 1.0M 1.0Mb	0.5F 3.0K 3.0L 0.5M 0.5Mb	40 CFR 180.399 54 FR 31832
Isopropyl¹ carbanilate [IPC, Isopropocarb]	0.05F 0.05Mb	0.05F 0.05Mb	0.05F 0.05Mb	0.05F 0.05Mb	0.05F 0.05Mb	40 CFR 180.319
Isopropyl¹ -m-chloro-car- banilate [CIPC, Chlorpropham]	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.319

1 Interim tolerance.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Ivermectin	15L ¹	30L ²	20L ³	-	-	21 CFR 566.344
Lasalocid	0.7L ⁴	- ⁵	-	0.3Sf ⁶	-	21 CFR 556.347
Levamisole	0.1Et	0.1Et ⁷	0.1Et	-	-	21 CFR 556.350
Lincomycin	-	-	0.1Et	-	-	21 CFR 556.360 55 FR 3208
Lindane	7F	7F	4F	4F ⁸	7F	40 CFR 180.133 MPI Dir 917.1
Linuron	1F 1M 1Mb	1F 1M 1Mb	1F 1M 1Mb	-	1F 1M 1Mb	40 CFR 180.184
Maduramicin ammonium	-	-	-	0.38F ⁹	-	21 CFR 556.375

1 Tolerance in ppb for 22,23-dihydroavermectin

B1a; corresponds to 50 ppb total residues in liver.

2 Sheep only; tolerance in ppb for 22,23 dihydroavermectin

B1a; corresponds to 125 ppb total.

3 Tolerance in ppb for 22,23-dihydroavermectin B1a;

corresponds to 75 ppb total residues in liver.

4 Tolerance for parent lasalocid; corresponds to 4.8 ppm

total residues in liver.

5 Tolerance for marker residue not needed. Sheep only.

6 Chickens only; tolerance for parent lasalocid; corresponds

to 7.2 ppm total residues in liver.

7 Sheep only.

8 Action level.

9 Chickens only; tolerance for marker residue.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are	POULTRY parts per million	HORSES	REFERENCE
Malathion	4F 4M 4Mb	4F 4M 4Mb	4F 4M 4Mb	4F 4M 4Mb	4F 4M 4Mb	40 CFR 180.111
Melengestrol acetate	0(0.025)Et	-	-	-	-	21 CFR 556.380
N-(Mercapto- methyl) phthalimide-S- (O,O-dimethyl phosphoro- dithioate) & oxygen analog [Phosmet]	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	-	0.2F 0.2M 0.2Mb	40 CFR 180.261
Metalaxyl & metabolite	0.4F 0.4K 0.4L 0.05M 0.05Mb	0.4F 0.4K 0.4L 0.05M 0.05Mb	0.4F 0.4K 0.4L 0.05M 0.05Mb	0.4F 0.4K 0.4L 0.05M 0.05Mb	0.4F 0.4K 0.4L 0.05M 0.05Mb	40 CFR 180.408
Methidathion	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.298
Methoprene	0.3F 0.1M 0.1Mb	0.3F 0.1M 0.1Mb	0.3F 0.1M 0.1Mb	0.5F 0.5M 0.05Mb	0.3F 0.1M 0.1Mb	40 CFR 180.359
Methoxychlor	3F	3F	3F	3F ¹	3F	40 CFR 180.120 MPI Dir 917.1
2-Methyl-4- chlorophenoxy acetic acid & metabolite [MCPA]	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.339

1 Action level.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
6-Methyl-1,3-dithiolo[4,5-b]quinoxalin-2-one [Oxythioquinox]	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	-	0.05F 0.05M 0.05Mb	40 CFR 180.338
1-Methylethyl-2-((ethoxy((1-methylethyl) amino) phosphinothioyl) oxy)benzoate & metabolites [Isofenphos]	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.387
Metolachlor & metabolites	0.02F 0.2K 0.05L 0.02M 0.02Mb	0.02F 0.2K 0.05L 0.02M 0.02Mb	0.02F 0.2K 0.05L 0.02M 0.02Mb	0.02F - 0.05L 0.02M 0.02Mb	0.02F 0.2K 0.05L 0.02M 0.02Mb	40 CFR 180.368
Metoserpate hydrochloride	-	-	-	0.02Et ¹	-	21 CFR 556.410
Metribuzin	0.7F 0.7M 0.7Mb	0.7F 0.7M 0.7Mb	0.7F 0.7M 0.7Mb	0.7F 0.7M 0.7Mb	0.7F 0.7M 0.7Mb	40 CFR 180.332
Metsulfuron methyl	0.1F 0.5K 0.1M 0.1Mb	0.1F 0.5K 0.1M 0.1Mb	0.1F 0.5K 0.1M 0.1Mb 0.5K	-	0.1F 0.5L 0.1M 0.1Mb	40 CFR 180.428 56 FR 40258
Monensin	0.05ET	0.05Et ²	-	- ³	-	21 CFR 556.420 54 FR 32633

1 Chickens only.

2 Goats only.

3 Chickens, turkeys, and quail;
tolerance for marker residue not needed.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Morantel tartrate	0.70L ¹	-	-	-	-	21 CFR 556.425
Mycolbutanil & metabolite	0.05F 0.3L 0.05M 0.05Mb	0.05F 0.3L 0.05M 0.05Mb	0.05F 0.3L 0.05M 0.05Mb	0.02F - 0.02M 0.02Mb	0.05F 0.3L 0.05M 0.05Mb	40 CFR 180.443
Naled & metabolite	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.215
Narasin²	-	-	-	- 0.6M 1.8L 1.2Sf	-	21 CFR 556.428
Neomycin	0.25Et ³ 1.00F ⁴ 0.75K ⁴ 0.50L ⁴ 0.25M ⁴	- 1.25F ⁴ 1.25K ⁴ 1.25L ⁴ 0.25M ⁴	- 1.00F ⁴ 1.00K ⁴ 0.75L ⁴ 0.25M ⁴	- 0.50F ⁴ 1.00K ⁴ 0.75L ⁴ 0.25M ⁴	- 0.25M ⁴	21 CFR 556.430
Nequinat	-	-	-	0.1Et ²	-	21 CFR 556.440
Nicarbazine	-	-	-	4K ² 4L ² 4M ² 4S ²	-	21 CFR 556.445

- 1 Tolerance for marker residue
N-methyl-1-3-propanediamine
(MAPA); corresponds to 2.40 ppm total
residues in liver.
- 2 Chickens only; safe concentrations.
- 3 Calves only.
- 4 Action level (letter from J. Taylor of FDA
to L. Crawford of FSIS, January 26, 1988.)

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Nicotine	-	-	-	1F 1M 1Mb	-	40 CFR 180.167a
Nitrapyrin & metabolite	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.350
Norflurazon	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.356
Novobiocin	1Et	-	-	1Et	-	21 CFR 556.460
Nystatin	-	-	0(5.6)Et	0(5.6)Et	-	21 CFR 556.470
N-Octyl bicycloheptene- dicarboximide	0.3F	0.3F	0.3F	-	0.3F	40 CFR 180.367
Oleandomycin	-	-	0.15Et	0.15Et	-	21 CFR 556.480
Ormetoprim	-	-	-	0.1Et	-	21 CFR 556.490
Oxadiazon & metabolites	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	0.01F 0.01M 0.01Mb	-	0.01F 0.01M 0.01Mb	40 CFR 180.346
Oxfendazole	0.8L ¹	-	-	-	-	21 CFR 556.495 55 FR 46943
Oxyfluorfen & metabolites	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.381

1 Fenbendazole is marker residue.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Oxytetracycline	0.1Et	0.1Et	0.1Et	1F 3K 1L 1M 1S	-	21 CFR 556.500
Paraquat	0.05F 0.3K 0.05M 0.05Mb	0.05F 0.3K 0.05M 0.05Mb	0.05F 0.3K 0.05M 0.05Mb	0.01F - 0.01M 0.01Mb	0.05F 0.3K 0.05M 0.05Mb	40 CFR 180.205
PCB's ¹	-	-	-	3F ²	-	21 CFR 109.30
Penicillin	0.05Et	0(0.04)Et	0(0.04)Et	0(0.04)Et ³	-	21 CFR 556.510
Permethrin & metabolites ⁴	3.0F 0.25M 2.0Mb	3.0F 0.25M 2.0Mb	3.0F 0.25M 3.0Mb	0.15F 0.05M 0.25Mb	3.0F 0.25M 2.0Mb	40 CFR 180.378
Phenothiazine	2F 2M 2Mb	-	-	-	-	40 CFR 180.319 ⁵

1 The temporary tolerances for unavoidable residues of PCB's in infant & junior foods are 0.2 ppm [21 CFR 109.30(a)(3,8)].

2 Action level.

3 Chickens, pheasants, and quail; turkeys 0.01Et; ducks and geese 0.01Et (action level).

4 All units are parts per billion.

5 Interim tolerance.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Phorate & metabolite	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	40 CFR 180.206
Phosalone	0.25F 0.25M 0.25Mb	0.25F 0.25M 0.25Mb	0.25F 0.25M 0.25Mb	-	0.25F 0.25M 0.25Mb	40 CFR 180.263
Picloram	0.2F 5K 0.5L 0.2M 0.2Mb	0.2F 5K 0.5L 0.2M 0.2Mb	0.2F 5K 0.5L 0.2M 0.2Mb	0.05F - - 0.05M 0.05Mb	0.2F 5K 0.5L 0.2M 0.2Mb	40 CFR 180.292
Piperonyl butoxide	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	3F 3M 3Mb	0.1F 0.1M 0.1Mb	40 CFR 180.127
Pirimiphos-methyl & metabolites	0.2F 2.0K 2.0L 0.2M 0.2Mb	0.2F 2.0K 2.0L 0.2M 0.2Mb	0.2F 2.0K 2.0L 0.2M 0.2Mb	0.2F - - 2.0M 2.0Mb	0.2F 2.0K 2.0L 0.2M 0.2Mb	40 CFR 180.409
Primisulfuron-methyl	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.452 55 FR 21547
Profenofos & metabolites	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05F 0.05M 0.05Mb	0.05 0.05M 0.05Mb	40 CFR 180.404
Profluralin	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.348

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
			units are parts per million			
Progesterone	12F ¹ 9K ¹ 6L ¹ 3M ¹	15F ² 15K ² 15L ² 3M ²	-	-	-	21 CFR 556.540
Propanil & metabolites	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.274
Propargite	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	40 CFR 180.259
Pyrantel tartrate	-	-	10K 10L 1M	-	-	21 CFR 556.560
Pyrethrins	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.2F 0.2M 0.2Mb	0.1F 0.1M 0.1Mb	40 CFR 180.128
Quizalofop ethyl & metabolites	0.05F 0.02M 0.05Mb	0.05F 0.02M 0.05Mb	0.05F 0.02M 0.05Mb	0.05F 0.02M 0.05Mb	0.05F 0.02M 0.05Mb	40 CFR 180.441
Robenidine hydrochloride	-	-	-	0.2F ¹ 0.2S ¹ 0.1Et ²	-	21 CFR 556.580
Ronnel & metabolites	10F 4M 4Mb	10F 4M 4Mb	3F 2M 2Mb	0.01F 0.01M 0.01Mb	-	40 CFR 180.177

Roxarsone (see Arsenic)

1 Steers and calves (ppb); above concentrations naturally present.

2 Lambs (ppb); above concentrations naturally present.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Simazine	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	40 CFR 180.213
Spectinomycin	-	-	-	0.1Et ¹	-	21 CFR 556.600
Streptomycin	. ²	-	0(0.5)Et	0(0.5)Et	-	21 CFR 556.610
Sulfabromo- methazine	0.1Et	-	-	-	-	21 CFR 556.620
Sulfachloropyra- zine	-	-	-	0(0.1)Et ¹	-	21 CFR 556.625
Sulfachlorpyrida- zine	0.1Et ³	0.1Et	-	-	-	21 CFR 556.630
Sulfadimethoxine	0.1Et	-	-	0.1Et	-	21 CFR 556.640
Sulfaethoxy- pyridazine	0.1Et	-	0(0.1)Et	-	-	21 CFR 556.650 MPI Dir 917.1
Sulfamethazine	0.1Et	-	0.1Et	0.1Et	-	21 CFR 556.670
Sulfanitran & metabolites	-	-	-	0(0.1)Et ²	-	21 CFR 556.680
Sulfathiazole	-	-	0.1Et	-	-	21 CFR 556.690
Sulfaquinoxaline	-	-	0.1Et	0Et	-	21 CFR 520.2325a
Sulfomyxin	-	-	-	0(0.1)Et	-	21 CFR 556.700

1 Chickens.

2 Administrative tolerance 2.0K.

3 Calves only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE	POULTRY	HORSES	REFERENCE
units are parts per million						
Tebuthiuron & metabolites	2F 2M 2Mb	2F 2M 2Mb	-	-	2F 2M 2Mb	40 CFR 180.390
Terbacil & metabolites	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	0.1F 0.1M 0.1Mb	40 CFR 180.209
Testosterone propionate	2.6F ¹ 1.9K ¹ 1.3L ¹ 0.64M ¹	-	-	-	-	21 CFR 556.710
Tetracycline	0.25Et ²	0.25Et	0.25Et	0.25Et	-	21 CFR 556.720
Tetradifon	0M	0M	0M	0M	0M	40 CFR 180.174
Thiabendazole & metabolites	0.1Et 0.1F 0.1M 0.1Mb	0.1Et 0.1F 0.1M 0.1Mb	0.1Et 0.1F 0.1M 0.1Mb	0.1Et 0.1F 0.1M 0.1Mb	0.1Et 0.1F 0.1M 0.1Mb	21 CFR 556.730 40 CFR 180.242
Thidiazuron & metabolites	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	40 CFR 180.403
Thiobencarb & metabolites	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	0.2F 0.2M 0.2Mb	40 CFR 180.401

1 Heifers only (ppb) above concentrations naturally present.

2 Calves only.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY	HORSES	REFERENCE
Thiophanate-methyl & metabolites	0.1M 0.1F 0.2K 0.1Mb 2.5L	0.1M 0.1F 0.2K 0.1Mb 2.5L	- 0.2F 1.0L 0.1Mb 0.1M	- 0.1F 0.2L 0.1Mb 0.1M	- 0.1F 1.0L 0.1Mb 0.1M	40 CFR 180.371
Tiamulin	-	-	0.4L ¹	-	-	21 CFR 556.738
Tilmicosin	1.2L	-	-	-	-	21 CFR 556.735 57 FR 12711
Toxaphene ²	7F	7F	7F	7F	7F	40 CFR 180.138 MPI Dir 917.1
Trenbolone	- ³	-	-	-	-	21 CFR 556.739
Triasulfuron ⁴	0.1F 0.2K 0.1M 0.1Mb	0.1F 0.2K 0.1M 0.1Mb	0.1F 0.2K 0.1M 0.1Mb	-	0.1F 0.2K 0.1M 0.1Mb	57 FR 8845
S,S,S-Tributyl-phosphorotrithioate	0.02F 0.02M 0.02Mb	0.02F 0.02M 0.02Mb	-	-	-	40 CFR 180.272
Trichlorfon	0.1F 0.1M 0.1Mb	0.1F 0.1M 0.1Mb	-	-	0.1F 0.1M 0.1Mb	40 CFR 180.198

1 Tolerance for 8-a-hydroxymutilin; corresponds to 10.8 ppm total residues in liver.

2 Action level.

3 Tolerance not needed.

4 Tolerances established until March 13, 1995.

1994 RESIDUE LIMITS

COMPOUND	CATTLE	SHEEP/ GOATS	SWINE units are parts per million	POULTRY parts per million	HORSES	REFERENCE
Triclopyr & metabolites	0.05F 0.5K 0.5L 0.05M 0.05Mb	0.05F 0.5K 0.5L 0.05M 0.05Mb	0.05F 0.5K 0.5L 0.05M 0.05Mb	0.2F ¹ 1.0K ¹ 0.2L ¹ 0.2M ¹ 0.2Mb ¹	0.05F 0.5K 0.5L 0.05M 0.05Mb	40 CFR 180.417
Triphenyltin hydroxide	0.05K 0.05L	0.05K 0.05L	0.05K 0.05L	-	0.05K 0.05L	40 CFR 180.236
Tylosin	0.2F 0.2K 0.2L 0.2M	-	0.2F 0.2K 0.2L 0.2M	0.2F 0.2K 0.2L 0.2M	-	21 CFR 556.740
Virginiamycin	-	-	0.4F 0.4K 0.3L 0.1M 0.4S	0.2F ² 0.5K ² 0.3L ² 0.1M ² 0.2S ¹	-	21 CFR 556.750
Zeranol	150M ³ 300L ³ 450K ³ 600F ³	0(0.020)Et ⁴	-	-	-	21 CFR 556.760
Zinc ion & Maneb, coordi- nation product [Mancozeb]	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	0.5K 0.5L	40 CFR 180.176
Zoalene & metabolite	-	-	-	2F ⁵ 6K ⁵ 6L ⁵ 3M ⁵	-	21 CFR 556.770

1 Tolerances established until July 11, 1990.

2 Broiler chickens only.

3 Safe concentrations.

4 Sheep only.

5 Chickens only; turkeys 3L, 3M.

Section 2

Compound Ranking

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COMPOUND RANKING

A. CRITERIA FOR COMPOUND EVALUATION SYSTEM (CES)

A key aspect of food safety in the modern world is the control of residues in food that may result from the use of animal drugs and pesticides, or from incidents involving environmental contaminants. The United States has a complex residue control system with rigorous processes for approval, sampling and testing, and enforcement. Three agencies play major roles in protecting the public from residues left in food by drug, agricultural chemical, and environmental contaminants. The Environment Protection Agency (EPA) regulates pesticides that can be used in food production and other industrial chemicals that have the potential for contaminating food. EPA sets the tolerances for pesticides and other chemicals. The Food and Drug Administration (FDA) regulates and inspects foods other than meat and poultry and regulates animal feeds. FDA determines if the drugs can be introduced into the market. This includes establishing tolerances for residues of animal drugs in edible tissues. The Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture is responsible for ensuring that meat and poultry sold in interstate commerce in the U.S. is safe, wholesome, and accurately labeled. As part of this responsibility, FSIS has since 1967 conducted the National Residue Program (NRP) to sample meat and poultry for residues. The goal of the NRP is to protect the consuming public from meat and poultry containing concentrations of residues that exceed the tolerances set by EPA and FDA. The specific objectives of the NRP are:

1. To assess and communicate the exposure potential from residues in the Nation's meat and poultry supply.
2. To prevent live animals with violative concentrations of residues in their tissues from being presented for slaughter.
3. To prevent edible tissues from slaughtered animals containing violative concentrations of residues from entering the food supply.

There are several hundred pesticides registered for use in the United States; pesticide residues may also occur in meat and poultry as the result of environmental contamination. The number of potential residues from animal drugs is equally impressive. It is not necessary, however, to monitor for residues of all chemicals, since they differ greatly in ability to produce a residue, degree of hazard to health, and potential for exposing the human population to their residues. In deciding where available resources and testing efforts should be assigned, FSIS must assess relative concerns for those residues most likely to have the greatest impact on public health. Similarly, the allocation of research and development resources must be based on the evaluation of the public health hazard.

COMPOUND RANKING

For purposes of developing and managing the NRP, compounds are given precedence using a risk assessment procedure. The Compound Evaluation System (CES) was developed in 1985. Under the initial version of the CES, compounds that may leave residues were ranked both for toxicity and for probability of human exposure. This is in reference to "The Compound Evaluation System", Second Edition, Revised 1991, Developed by The Residue Evaluation and Planning Division, S&T/FSIS/USDA.

After several years experience with the CES, the Agency determined that additional criteria were needed in order to select chemicals for our testing program that are most likely to leave a residue. In the revised version, the CES has three potential factors, the first being whether the compound produces a residue. If so, the second CES factor is hazard (adverse effects that may be produced by a given compound), which is ranked from A (high) to D (low) and Z (unknown). The third factor, exposure, involves such considerations as residue concentration and factors affecting concentration, such as use patterns, withdrawal times, and duration of consumption of product containing the residues of concern. Exposure is ranked from 1 (likely) to 4 (unlikely) and Z (unknown). The CES ranking, or risk characterization, is a product of both hazard and exposure. In summary, the basic approach to compound ranking consists of three elements:

1. Determining if a compound can cause a residue;

If the answer is Yes, then,

2. Assessing the hazard of the compound, and
3. Assessing the potential human exposure resulting from occurrence in meat and poultry.

The Agency's ongoing evaluation of information for compound ranking is aided by an advisory board; the Surveillance Advisory Team which consists of scientists from EPA, FDA, and USDA (FSIS and the Agricultural Marketing Service). This advisory relationship is defined in a Memorandum of Understanding among the three agencies (Federal Register, January 16, 1985).

Compounds may be rotated out of the NRP but can be added during the year if the need arises. Over the past ten years, virtually all drugs, pesticides and environmental contaminants for which suitable methods were available have been monitored, except for compounds with especially low rankings; i.e., carboxin, atrazine, etc.

B. COMPOUNDS RANKED UNDER COMPOUND EVALUATION SYSTEM (CES)

Compound	CES Ranking	Year of Publication
Acephate	B-4	1989
Acepromazine	B-4	1991
Aflatoxin	A-4	1985
Aklomide	Z-4	1991
Alachlor	A-2	1985
Albendazole	A-2	1987
Aldicarb	A-4	1986
Aldrin	A-3	1986
Ametryn	D-4	1990
Amitraz	B-3	1989
Ampicillin	B-2	1985
Ampicillin trihydrate	B-2	1985
Amprolium	A-4	1990
Arsanilic acid	C-1	1987
Atrazine	C-3	1985
Azaperone	B-4	1986
Benomyl	B-3	1986
BHC	B-2	1987
Cadmium	B-4	1985
Cambendazole	A-4	1993
Captan	B-3	1987
Carbadox	A-3	1987
Carbarsone	C-2	1987
Carbaryl	C-2	1988
Carbofuran	C-3	1986
Carboxin	C-4	1987
Ceftiofur	B-4	1992
Chloramphenicol	A-2	1985
Chloramphenicol palmitate	A-2	1985
Chlordane (technical)	A-2	1987
Chlorpyrifos	B-4	1986
Chlortetracycline	B-2	1992
Clenbuterol	B-4	1991
Cloprostenol	B-4	1988
Clorsulon	D-4	1990
Coumaphos & oxygen analog	B-2	1988
Cyano (3-phenoxyphenyl) methyl-4-chloro-alpha- (1-methylethyl) benzeneacetate [Fenvalerate]	D-3	1989
Cypermethrin	B-3	1989
Cyromazine	B-3	1989
2,4,D (technical)	B-2	1987
Dalapon	A-3	1985
Daminozide	B-3	1985
DDT	B-3	1989
Decoquate	Z-4	1986

COMPOUNDS RANKED UNDER COMPOUND EVALUATION SYSTEM (CES)

Compound	CES Ranking	Year of Publication
Deltamethrin	C-4	1989
Dibutyltin dilaurate	A-1	1988
Dichlorvos	B-4	1987
O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate (Disulfoton)	A-2	1988
Dihydrostreptomycin	A-1	1989
Dimethoate	B-3	1986
Dimethyl sulfoxide	A-4	1989
Dimetridazole	A-4	1993
Dinoprost tromethamine	B-4	1988
Diphenylamine	B-4	1985
Dodecachlorooctahydro-1,3,4-metheno-2H-cyclobuta[cd]pentalene[Mirex]	A-4	1992
Endrin	A-3	1986
Ethalfuralin	A-4	1993
Ethylene dibromide	A-4	1986
Febantel	A-4	1993
Fenbendazole	B-3	1987
Fenthion	C-3	1985
Furazolidone	A-1	1987
Gentamicin sulfate	B-2	1986
Gentian Violet	A-2	1991
Halofuginone	A-1	1989
Heptachlor and heptachlor expoide	A-1	1987
Hexachlorobenzene (HCB)	A-3	1989
Hexazinone	D-1	1985
Hygromycin B	A-3	1991
Ipronidazole	Z-4	1986
Ipronidazole hydrochloride	Z-4	1986
Ivermectin	B-1	1986
Lead	B-4	1985
Levamisole	C-2	1985
Levamisole hydrochloride	C-2	1985
Lincomycin	D-4	1992
Lindane	A-2	1986
Linuron	A-3	1989
Mebendazole	B-4	1986
Melengestrol acetate	B-4	1989
Methamidophos	A-4	1990
Methoxychlor	D-4	1987
Methyl bromide	B-4	1986
Methylene chloride	A-2	1986

COMPOUNDS RANKED UNDER COMPOUND EVALUATION SYSTEM (CES)

Compound	CES Ranking	Year of Publication
Monensin	B-3	1985
Monuron	B-4	1990
Morantel tartrate	B-4	1992
Naled	B-4	1987
Neomycin sulfate	B-3	1986
Nicarbazin	B-3	1990
Oxfendazole	B-4	1993
Oxytetracycline hydrochloride	B-1	1992
Paraquat	A-4	1986
PCB's	A-4	1985
Penicillin	A-2	1992
Pentachlorophenol (PCP)	B-1	1985
Permethrin	B-2	1987
Picloram	C-4	1989
Prometryn	C-3	1987
Propanil	A-4	1991
Propazine	C-4	1988
Roxarsone	C-3	1987
Silvex	A-3	1986
Simazine	C-3	1988
Spectinomycin	B-2	1991
Streptomycin	A-3	1986
Styrene	C-2	1989
Sulfadimethoxine	A-3	1992
Sulfamethazine	B-1	1985
Sulfaquinoxaline	B-1	1987
Sulfathiazole	B-1	1987
2,4,5-T	A-3	1985
Tetracycline hydrochloride	A-1	1992
Thiabendazole	B-2	1987
Thiram	A-2	1990
Tiamulin	D-3	1989
Toxaphene	A-2	1985
Trenbolone acetate	C-4	1990
Trichlorfon	B-3	1985
Trifluralin	C-4	1986
Triphenyltin hydroxide	B-4	1986
Tylosin	D-2	1989
Virginiamycin	D-4	1989
Xylazine	Z-4	1986
Zeranol	C-2	1986
Zinc	D-4	1985

Section 3
Historical List of Compounds
for the National Residue Program

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PART A: LIST OF HISTORICAL COMPOUNDS

This Section lists historical compounds considered for possible inclusion in the NRP as well as compounds included in the program.

Reference refers to regulatory documents, i.e.,

CFR (Code of Federal Regulation),
FR (Federal Register),
NADA (New Animal Drug Application).

CFR reference names, where available, are used for the primary entries; common names are given in brackets, where applicable.

Complex mixtures such as PCB's are listed as a single entry.

Isomers of a compound, i.e., compounds having the same percentage composition and molecular weight but differing in chemical or physical properties are not listed separately.

Metabolites are listed with the parent compound.

Residue designation denotes the compound or compound class names used to compose the annual plan and under which residue results are reported.

PART B: COMPOUNDS INCLUDED IN THE NATIONAL RESIDUE PROGRAM PLAN

This compilation includes all of the compounds tested for during the years of 1972-1994 grouped according to residue class.

A. LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Acephate & metabolite	40 CFR 180.108	Insecticide
Acepromazine	21 CFR 520.23	Tranquilizer
2--Acetylamino-5-nitrothiazole	21 CFR 556.20	Antitrichomonal
Acifluorfen & metabolites	40 CFR 180.383	Herbicide
Aflatoxin	none	Mycotoxin
Aklomide & metabolites	21 CFR 556.30 21 CFR 558.35	Coccidiostat
Alachlor	40 CFR 180.249	Herbicide
Albendazole	21 CFR 556.34 21 CFR 520.45	Anthelmintic
Aldicarb & metabolites	40 CFR 180.269	Insecticide
Aldrin	51 FR 46662 ¹	Insecticide
Aluminum tris (o-ethylphosphonate)	40 CFR 180.415	Fungicide
Ametryn	40 CFR 180.258	Herbicide
Amitraz & metabolites	40 CFR 180.287	Acaricide
Amoxicillin trihydrate	21 CFR 556.38 21 CFR 540.103	Antibacterial
Ampicillin	21 CFR 556.40 21 CFR 540.105/107	Antibacterial
Amprolium	21 CFR 556.50 21 CFR 520.100 21 CFR 558.55	Coccidiostat
Apramycin	21 CFR 556.52 21 CFR 520.110	Antibiotic
Arsanilate sodium	21 CFR 556.60 21 CFR 558.62	Growth Promotant
Arsanilic acid	21 CFR 556.60	Growth Promotant

¹ Tolerance revoked December 24, 1986.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Arsenate, Calcium	40 CFR 180.192	Insecticide
Arsenate, Lead	40 CFR 180.194	Insecticide
Arsenic	21 CFR 556.60	Trace Element
Arsenite, Sodium	40 CFR 180.335	Insecticide
Atrazine	40 CFR 180.220	Herbicide
Avermectin	53 FR 22383	Insecticide
Azaperone	21 CFR 522.150	Tranquilizer
Bacitracin	21 CFR 556.70 21 CFR 548.112/114 21 CFR 558.76/78	Antibiotic
Bambermycins (flavomycin)	21 CFR 558.95	Antibiotic
Bendiocarb	none	Insecticide
Benomyl & metabolite	40 CFR 180.294	Fungicide
Bentazon & metabolite	40 CFR 180.355	Herbicide
BHC (Benzene hexachloride)	51 FR 25697 ¹	Insecticide
Bifenthrin	40 CFR 180.442	Insecticide
3,6-Bis(2-chlorophenyl- 1,2,4,5-tetrazine (Clofentezine)	56 FR 22333	Pesticide
Bismuth subsalicylate	NADA 010-158	Drug
Bromoxynil	40 CFR 180.324	Herbicide
Bufencarb	40 CFR 180.255	Insecticide
Buquinolate	21 CFR 556.90 21 CFR 558.105	Coccidiostat
sec-Butylamine	21 CFR 561.60 40 CFR 180.321	Fungicide
Cacodylic acid	40 CFR 180.311	Herbicide

¹ Tolerances revoked July 16, 1986.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Cadmium	none	Trace Element
Calcium	none	Trace Element
Cambendazole	21 CFR 520.300	Vermifuge
Captafol	40 CFR 180.267	Fungicide
Captan	40 CFR 180.103	Fungicide
Carbadox & metabolites	21 CFR 556.100 21 CFR 558.115	Antiparasitic
Carbarsone	21 CFR 558.120	Antiamebic
Carbaryl & metabolites	40 CFR 180.169	Insecticide
Carbofuran & metabolites	40 CFR 180.254	Acaricide
Carbomycin	21 CFR 556.110 21 CFR 520.1660a	Antibiotic
Carbophenothion	40 CFR 180.156	Pesticide
Carboxin & metabolite	40 CFR 180.301	Fungicide
Ceftiofur	21 CFR 556.113	Antibacterial
Cephapirin	21 CFR 522.313 21 CFR 556.115 21 CFR 526.363 21 CFR 529.365	Antibacterial
Chloral hydrate	21 CFR 522.380	Sedative
Chloramphenicol	21 CFR 520.390	Antimicrobial
Chlorbromuron	none ¹	Herbicide
Chlordane ²	none ³	Insecticide

¹ Tolerances revoked May 4, 1988.

² Residues of metabolized technical chlordane are reported as the sum of the isomers of chlordane, oxychlordane, and nonachlor.

³ Tolerances revoked December 24, 1986.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Chlordecone (Kepone)	none	Insecticide
Chlordimeform	40 CFR 180.285	Insecticide
Chlorhexidine dihydrochloride	21 CFR 556.120 21 CFR 524.402 21 CFR 529.400	Disinfectant
Chlormadinone acetate	none ¹	Progestogen
Chlorobutanol	21 CFR 556.140	Antimicrobial
2-Chloro-N,N-dial- lylacetamide (Allidochlor)	40 CFR 180.282	Herbicide
2-Chloro-1-(2,4- dichlorophenyl) vinyl diethyl phosphate [Chlorfenvinphos]	40 CFR 180.322	Insecticide
2-Chloro-N-isopropyl- acetanilide (Propachlor)	40 CFR 180.211	Herbicide
Chloroneb & metabolite	40 CFR 180.257	Fungicide
Beta-(4-Chlorophenoxy)- alpha-(1,1-dimethylethyl)-1H- 1,2,4-triazole-1-ethanol [Triadimenol]	40 CFR 180.450	Fungicide
1-(4-Chlorophenoxy)-3,3- Dimethyl-1(1H-1,2,4-triazol- 1-yl)-2-Butanone & metabolite (Triademefon)	40 CFR 180.410	Fungicide
2-(m-Chlorophenoxy) propionic acid	40 CFR 180.325	Plant Growth Regulator
Chlorothalonil	40 CFR 180.275	Fungicide

¹ Tolerances withdrawn in June 1982.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Chlorothiazide	21 CFR 520.420	Diuretic
2-Chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate [Stirofos, Tetrachlorvinphos]	40 CFR 180.252	Insecticide
Chlorpyrifos & metabolites	40 CFR 180.342	Insecticide
Chlorpyrifos-methyl & metabolite	40 CFR 180.419	Insecticide
Chlorsulfuron	40 CFR 180.405	Herbicide
Chlortetracycline	21 CFR 556.150 21 CFR 558.128 21 CFR 546.110/113	Antibacterial
Chorionic gonadotrophin	21 CFR 522.1081	Hormonal Veterinary Drug
Clenbuterol	none	Anti-Asthmatic
Clethodim ¹	40 CFR 180.458 57 FR 3296	Herbicide
Clofentezine ²	40 CFR 180.446 53 FR 16780	Pesticide
Clopidol	21 CFR 556.160 21 CFR 558.175	Coccidiostat
Cloprostenol sodium	21 CFR 522.460	Fertility Enhancer
Clopyralid	40 CFR 180.431	Herbicide
Clorsulon	21 CFR 556.163 21 CFR 520.462	Anthelmintic
Cloxacillin	21 CFR 556.165 21 CFR 540.814/815	Antibacterial
Cobalt	none	Trace Element

1 Tolerance expires January 31, 1994.

2 Tolerance expires September 30, 1994.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Copper	none	Trace Element
Copper glycinate	NADA 031-971	Nutritional Factor
Copper naphthenate	NADA 012-991	Topical anti- fungal
Corticotropin	NADA 008-760	Hormone
Coumaphos & oxygen analog	40 CFR 180.189 21 CFR 558.185 21 CFR 520.500	Insecticide
Cresylic acid	none	Disinfectant
Crufomate & metabolite	40 CFR 180.295	Insecticide
Cyanide salts	none	
Cyano (3-phenoxyphenyl) methyl-4-chloro-a-(methyl- ethyl)benzeneacetate [Fenvalerate]	40 CFR 180.379	Insecticide
Cyfluthrin	40 CFR 180.436	Insecticide
Cyhalothrin	40 CFR 180.438	Insecticide
Cyhexatin	40 CFR 180.144	Acaricide
Cypermethrin	40 CFR 180.418	Insecticide
Cyromazine ¹ & metabolite	40 CFR 180.414	Insecticide
2,4-D & metabolite	40 CFR 180.142/331	Herbicide
Dalapon	40 CFR 180.150	Herbicide
Daminozide	40 CFR 180.246	Plant Growth Regulator
DDT & metabolites	51 FR 46658 ²	Insecticide
Decoquinate	21 CFR 556.170 21 CFR 558.195	Coccidiostat

¹ Trade name, Larvadex.

² Tolerances revoked December 24, 1986.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Deltamethrin	none	Insecticide
Demeton	40 CFR 180.105	Insecticide
Dexamethasone	21 CFR 520.540	Anti-inflammatory
Dialifor & oxygen analog	40 CFR 180.326	Insecticide
Diazinon	40 CFR 180.153	Insecticide
1,1-Dichloro-2,2-bis (p-ethylphenyl)ethane [Perthane,Ethylan]	40 CFR 180.139	Insecticide
Dibromochloropropane	none	Nematocide
Dibutyltin dilaurate	NADA 008-741 21CFR 558.20	Anthelmintic
Dicamba & metabolite	40 CFR 180.227	Herbicide
3,5-Dichloro-N- (1,1-dimethyl-2- propynyl) benzamide & metabolites [Pronamide, Propyzamide]	40 CFR 180.317	Herbicide
4-(2,4-Dichloro- phenoxy)butyric acid	40 CFR 180.331	Herbicide
2,4-Dichlorophenyl p-nitrophenyl ether [nitrofen]	none ¹	Herbicide
1-[[2-(2,4-Dichloro- phenyl)-4-propyl-1,3- dioxolan-2-yl]methyl]-1 H-1,2,4-triazole & metabolites [Propiconazole]	40 CFR 180.434	Fungicide
Dichlorvos	21 CFR 556.180 21 CFR 520.600 21 CFR 558.205 40 CFR 180.235 ²	Insecticide

¹ Tolerances revoked September 18, 1985.

² As 2,2-dichlorovinyl dimethyl phosphate.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Diclofop-methyl	40 CFR 180.385	Herbicide
Dieldrin	none ¹	Insecticide
O,O Diethyl-S-[2-(ethylthio)ethyl]phosphorodithioate	40 CFR 180.183	Insecticide
O,O-Diethyl-O[p(methylsulfinyl)-phenyl]phosphorothioate [Fensulfothion]	40 CFR 180.234	Pesticide
Diethylstilbestrol	none	Estrogen
Difenzoquat	40 CFR 180.369	Herbicide
Diflubenzuron	40 CFR 180.377	Insecticide
Dihydrostreptomycin	21 CFR 556.200 21 CFR 540.874 d,e 21 CFR 544.173/275	Antibacterial
Dimethipin	40 CFR 180.406	Harvest Growth Regulant
Dimethoate & oxygen analog	40 CFR 180.204	Insecticide
O,O-Dimethyl O-p-(dimethylsulfamoyl)phenyl phosphorothioate & metabolite [Famphur]	21 CFR 524.900 21 CFR 558.254 40 CFR 180.233	Insecticide
3,5-Dimethyl-4-(methylthio)phenyl methylcarbamate & metabolite(methiocarb)	40 CFR 180.320	Insecticide
O,O-Dimethyl S-[(4-oxo-1,2,3-benzotriazin-3(4H)-yl)methyl]phosphorodithioate [Azinphosmethyl & as Guthion]	40 CFR 180.154	Insecticide

¹ Tolerances revoked December 24, 1986.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
N-N-Dimethylpiperi- dinium chloride	40 CFR 180.384	Plant Growth Regulator
Dimethyl phosphate of a-methylbenzyl 3- hydroxy-cis-crotonate [Crotoxyphos]	40 CFR 180.280	Insecticide
Dimethyl sulfoxide	21 CFR 524.660 40 CFR 180.1001	Anti-inflammatory
Dimetridazole	none ¹	Antiprotozoal
3,5-Dinitrobenzamide	21 CFR 556.220 21 CFR 558.376 ²	Coccidiostat
Dinoprost tromethamine	21 CFR 522.690	Luteolytic hormone
Dinoseb	40 CFR 180.281	Herbicide, Insecticide, Fungicide
Dioxathion	40 CFR 180.171	Insecticide
Diphenamid	40 CFR 180.230	Herbicide
Diphenylamine	40 CFR 180.190	Fungicide
Dipropyl iso- cinchomerionate	40 CFR 180.143	Insecticide
Diquat	40 CFR 180.226	Herbicide
Diuron	40 CFR 180.106	Herbicide
Dodecachloroocta- hydro-1,3,4-metheno- 2H-cyclobuta[cd]pentalene [Mirex}	51 FR 45114	Insecticide
Dodine	40 CFR 180.172	Fungicide
Endosulfan & metabolite	40 CFR 180.182	Insecticide

¹ Tolerances and approvals for use withdrawn
July 6, 1987.

² As nitromide.

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Endrin	40 CFR 180.131	Insecticide
Erythromycin	21 CFR 556.230 21 CFR 526.820 21 CFR 558.248 21 CFR 520.823	Antibacterial
Estradiol	21 CFR 522.840 21 CFR 556.240	Estrogen
Estradiol benzoate	21 CFR 556.240 21 CFR 522.842/1940	Estrogen
Estradiol monopalmitate	21 CFR 556.240	Estrogen
Estradiol valerate	21 CFR 522.850	Estrogen
Ethalfluralin	40 CFR 180.416	Herbicide
Ethephon	40 CFR 180.300	Plant Growth Regulator
Ethion & oxygen analog	40 CFR 180.173	Pesticide
Ethofumesate & metabolites	40 CFR 180.345	Herbicide
Ethopabate	21 CFR 556.260 21 CFR 558.58	Coccidiostat
2-[1-(Ethoxyimino) butyl]-5-[2-(ethylthio) propyl]-3-hydroxy-2- cyclohexene-1-one [Sethoxydim]	40 CFR 180.412	Herbicide
Ethoxyquin	21 CFR 172.140	Antioxidant
5-Ethoxy-3-(trichloro- methyl)-1,2,4-thiadiazole & metabolite [Etridazole]	40 CFR 180.370	Fungicide
Ethyl 4,4'-dichlorobenzi- late [Chlorobenzilate]	40 CFR 180.109	Insecticide

LIST OF POTENTIAL COMPOUNDS

COMPOUNDS/ PRODUCTS	REFERENCE	CLASS/USE
Ethylene dibromide	40 CFR 180.126 ¹ 40 CFR 180.397	Fumigant
Ethyl 3-methyl-4- (methylthio)phenyl (1-methylethyl) phosphoramidate & metabolites [Fenamiphos]	40 CFR 180.349	Nematocide
O-Ethyl-O-[4- (methylthio) phenyl] S-propyl phosphoro- dithioate [Sulprofos]	40 CFR 180.374	Insecticide
O-Ethyl S-phenyl ethylphosphonodithioate [Fonofos]	40 CFR 180.221	Insecticide
S-[2-(Ethylsulfinyl) ethyl]O,O-dimethylphos- phorothioate & metabolites [Oxydemeton Methyl]	40 CFR 180.330	Pesticide
Fenarimol	40 CFR 180.421	Fungicide
Fenbendazole	21 CFR 556.275 21 CFR 520.905 21 CFR 558.258	Anthelmintic
Fenitrothion	none	Insecticide
Fenoxaprop-ethyl & metabolites	56 FR 42531	Herbicide
Fenprostalene	21 CFR 556.277 21 CFR 522.914	Estrus synchronization
Fenridazon, potassium salt	40 CFR 180.423	Hybridizing Agent
Fenthion	40 CFR 180.214 21 CFR 524.920	Acaricide

**1 No tolerances have been established for
residues in meat and poultry.**

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Fluazifop & butyl ester	40 CFR 180.411	Herbicide
Flucythrinate	40 CFR 180.400	Insecticide
Flumethasone	21 CFR 520.960 21 CFR 522.960 21 CFR 524.960	Anti-inflammatory
Fluprednisolone	NADA 012-555	Anti-inflammatory
Fluprednisolone acetate	NADA 011-789	Anti-inflammatory
Fluridone	40 CFR 180.420	Herbicide
Flurogestone acetate	NADA 034-601	Progestogen
Fluvalinate	40 CFR 180.427	Insecticide
Fluzilazol (Flusilazole)	53 FR 34513	Fungicide
Folic acid	NADA 013-029	Nutritional Factor
Follicle stimulating hormone	NADA 09-505 21 CFR 522.1822	Hormone
Folpet	40 CFR 180.191	Fungicide
Furaltadone	none	Antibacterial
Furazolidone	21 CFR 556.290 21 CFR 524.1005 21 CFR 558.262	Antimicrobial
Furosemide	21 CFR 522.1010	Diuretic
Gasoline	none	Fuel
Gentamicin sulfate	21 CFR 556.300 21 CFR 520.1044 21 CFR 524.1044 21 CFR 529.1044	Antibacterial
Gentian violet	none	Antimicrobial
Glyphosate & metabolite	40 CFR 180.364	Herbicide
Halofuginone	21 CFR 556.308 21 CFR 558.265	Coccidiostat

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Haloxon	21 CFR 556.310 21 CFR 520.1120	Anthelmintic
Hexachlorobenzene (HCB)	none	Fungicide
Heptachlor & heptachlor epoxide	40 CFR 180.104	Insecticide
Hetacillin, Potassium	21 CFR 540.829	Antibacterial
Hexakis (2-methyl-2 phenylpropyl) distannoxane	40 CFR 180.362	Insecticide
Hexazinone	40 CFR 180.396	Herbicide
Hexetidine	NADA 013-772	Antifungal
Hydrochlorothiazide	21 FR 522.1150	Diuretic
Hydrocortisone acetate	21 CFR 556.320 21 CFR 524.1484,d,h,i	Anti-inflammatory
5-[1-hydroxy-2-(isopropyl- amino)ethyl] anthranilonitrile (Cimaterol)	none	Repartitioning agent
Hygromycin B	21 CFR 556.330 21 CFR 558.274	Anthelmintic
Imazalil & metabolites	40 CFR 180.413	Fungicide
Iprodione	40 CFR 180.399	Fungicide
Ipronidazole & metabolite	none ¹	Antimicrobial
Iron	none	Trace Element
Isopropyl carbanilate [IPC, Propham]	40 CFR 180.319	Herbicide
Isopropyl m-chlorocar- banilate [CIPC, Chlorpropham]	40 CFR 180.319	Herbicide

¹ Tolerances and approval for use revoked
January 17, 1989.

LIST OF HISTIORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Ivermectin	21 CFR 556.344 21 CFR 520.1192,3,4,5 21 CFR 522.1192	Anthelmintic
Lasalocid	21 CFR 556.347 21 CFR 558.311	Coccidiostat
Lead	none	Trace Element
Levamisole	21 CFR 520.1240/42 21 CFR 522.1244 21 CFR 556.350 21 CFR 558.315	Anthelmintic
Lidocaine hydrochloride	21 CFR 522.1258	Local anesthetic
Lincomycin	21 CFR 556.360 21 CFR 520.1263 21 CFR 522.1260 21 CFR 558.325	Antibacterial
Lindane ¹	40 CFR 180.133	Insecticide
Linuron	40 CFR 180.184	Herbicide
Lysergic acid diethylamide	none	Depressant
Maduramicin ammonium	21 CFR 556.375 21 CFR 558.340	Coccidiostat
Malathion	40 CFR 180.111	Insecticide
Maneb	40 CFR 180.110	Fungicide
Manganese	21 CFR 582.5446	Trace Element
Mebendazole	21 CFR 520.1320/1326	Anthelmintic
Mefluidide	40 CFR 180.386	Herbicide
Melengestrol acetate	21 CFR 556.380 21 CFR 558.342	Progestogen
N-(Mercaptomethyl) phthalimide S-(O,O-dimethylphos- phorodithioate) & metabolite [Phosmet]	40 CFR 180.261 21 CFR 524.1742	Insecticide

¹ The gamma isomer of BHC.

LIST OF HISTORICAL COMPOUNDS

COMPOUNDS PRODUCT	REFERENCE	CLASS/USE
Mercury	none	Trace Element
Metalaxyl & metabolite	40 CFR 180.408	Fungicide
Methamidophos ¹	40 CFR 180.315	Insecticide
Methanearsonic acid	40 CFR 180.289	Herbicide
Methidathion	40 CFR 180.298	Herbicide
Methomyl	40 CFR 180.253	Insecticide
Methoprene	40 CFR 180.359	Insecticide
Methoxychlor	40 CFR 180.120	Insecticide
Methyl bromide	none	Fumigant
2-Methyl-4-chloro- phenoxyacetic acid & metabolite [MCPA]	40 CFR 180.339	Herbicide
6-Methyl-1,3-dithiolo [4,5-b]quinoxalin-2-one [Oxythioquinox]	40 CFR 180.338	Fungicide
Methylene chloride	40 CFR 180.1010	Insecticide
1-Methylethyl 2- [ethoxy((1-methylethyl) amino]phosphinothioyl) oxy)benzoate & metabolites [Isofenphos]	40 CFR 180.387	Insecticide
Methyl parathion	40 CFR 180.121	Insecticide
Metiram (Polyram)	40 CFR 180.217	Herbicide
Metolachlor & metabolites	40 CFR 180.368	Herbicide
Metoserpate hydrochloride	21 CFR 556.410 21 CFR 520.1422	Sedative

¹ Also listed as O,S-dimethyl phosphoramidothioate,
a metabolite of acephate.

LIST OF HISTORICAL COMPOUNDS

COMPOUNDS PRODUCT	REFERENCE	CLASS/USE
Metribuzin (Sencor)	40 CFR 180.332	Herbicide
Metsulfuron methyl	40 CFR 180.428	Herbicide
Monensin	21 CFR 556.420 21 CFR 520.1448 21 CFR 558.355	Coccidiostat
Monuron	none	Herbicide
Monuron-TCA	none	Herbicide
Morantel tartrate	21 CFR 556.425 21 CFR 520.1450 21 CFR 558.360	Anthelmintic
Myclobutanil	40 CFR 180.443	Fungicide
Naled & metabolite	40 CFR 180.215	Insecticide
Naloxone hydrochloride	21 CFR 522.1462	Narcotic Antagonist
Narasin	21 CFR 556.428 21 CFR 558.363	Coccidiostat
Neomycin sulfate	21 CFR 556.430 21 CFR 522.1484 21 CFR 524.1484	Antibacterial
Neostigmine methyl sulfate	21 CFR 522.1503	Cholinergic drug
Nequinate	21 CFR 556.440 21 CFR 558.365	Coccidiostat
Nicarbazine	21 CFR 556.445 21 CFR 558.366	Coccidiostat
Nickel	none	Trace Element
Nicotine	40 CFR 180.167	Anthelmintic
Nifuraldezone	none	Antibacterial
Nitrapyrin & metabolite	40 CFR 180.350	Microbiocide

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Nitrofurazone	21 CFR 524.1580	Antimicrobial
Norflurazon & metabolite	40 CFR 180.356	Herbicide
Novobiocin	21 CFR 556.460 21 CFR 558.415	Antimicrobial
Nystatin	21 CFR 556.470 21 CFR 558.430	Antifungal
N-Octyl bicyclo- heptenedicarboximide [Dimelone, Dimethyl Carbate]	40 CFR 180.367	Insecticide
Oleandomycin	21 CFR 556.480 21 CFR 558.435	Antibacterial
Ormetoprim	21 CFR 556.490 21 CFR 558.575	Coccidiostat
Oryzalin	40 CFR 180.304	Herbicide
Oxadiazon & metabolite	40 CFR 180.346	Herbicide
Oxfendazole	21 CFR 520.1629,30,31 21 CFR 556.495 55 FR 46943	Anthelmintic
Oxyfluorfen	40 CFR 180.381	Herbicide
Oxytetracycline hydrochloride	21 CFR 556.500 21 CFR 558.450 21 CFR 520.1660 21 CFR 522.1660	Antimicrobial
Oxytocin	21 CFR 522.1680	Hormone
Paraquat	40 CFR 180.205	Herbicide
Parathion	40 CFR 180.121	Insecticide
PBB's (Polybrominated biphenyls)	none	Fire retardant
PCB's (Polychlorinated biphenyls)	21 CFR 109.30	Heat exchanger

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Pencillin, procaine & procaine G, penicillin G	21 CFR 556.510 21 CFR 558.460 21 CFR 540.874	Antibacterial
Pentachlorophenol (PCP)	none	Insecticide
Permethrin & metabolites	40 CFR 180.378	Insecticide
Phencyclidine	none	Anesthetic
Phenothiazine	40 CFR 180.319 21 CFR 558.20	Insecticide
o-Phenylphenol	40 CFR 180.129	Fungicide
Phorate	40 CFR 180.206	Insecticide
Phosalone	40 CFR 180.263	Insecticide
Picloram	40 CFR 180.292	Herbicide
Piperazine	21 CFR 520.1802 21 CFR 558.20	Anthelmintic
Piperonyl butoxide	40 CFR 180.127	Insecticide
Pirimiphos-methyl & metabolites	40 CFR 180.409	Insecticide
Pituitary luteinizing hormone	21 CFR 522.1820	Hormone
Poloxalene	21 CFR 558.464 21 CFR 558.465	Surfactant
Polymyxin	21 CFR 524.1662b	Antibiotic
Prednisolone	21 CFR 556.520 21 CFR 522.1880-1890	Anti-inflammatory
Prednisone	21 CFR 556.530	Anti-inflammatory
Primisulfuron-methyl	40 CFR 180.452 55 FR 21547	Herbicide
Profenofos	40 CFR 180.404	Insecticide
Profluralin	40 CFR 180.348	Herbicide

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Progesterone	21 CFR 556.540 21 CFR 522.1940	Hormone
Prometryn	40 CFR 180.222	Herbicide
Propanil	40 CFR 180.274	Herbicide
Proparacaine hydrochloride	21 CFR 524.1982	Topical Anesthetic
Propargite	40 CFR 180.259	Pesticide
Propazine	40 CFR 180.243	Herbicide
Propionylpromazine	21 CFR 520.2002 21 CFR 522.2002	Tranquilizer
Pyrantel tartrate	21 CFR 556.560 21 CFR 520.2045 21 CFR 558.485	Anthelmintic
Pyrethrins	40 CFR 180.128	Insecticide
Quizalofop ethyl	40 CFR 180.441	Herbicide
Reserpine	none	Tranquilizer
Robenidine hydrochloride	21 CFR 556.580 21 CFR 558.515	Coccidiostat
Ronnel	40 CFR 180.177 21 CFR 558.525 21 CFR 520.2080	Insecticide
Roxarsone	21 CFR 556.60 21 CFR 558.530	Antibacterial
Salicylic acid	21 CFR 556.590 21 CFR 529.2090	Antifungal
Salinomycin	21 CFR 558.550	Coccidiostat
Selenium	21 CFR 522.2100 21 CFR 573.920	Trace Element
Silvex	40 CFR 180.340	Herbicide

LIST OF HISTORICAL COMPOUNDS

COMPOUND/ PRODUCT	REFERENCE	CLASS/USE
Simazine	40 CFR 180.213	Herbicide
Spectinomycin dihydrochloride	21 CFR 556.600 21 CFR 520.2122 21 CFR 522.2120	Antibacterial
Streptomycin	21 CFR 556.610 40 CFR 180.245	Antibacterial
Styrene	none	Plastics
Sulfabromomethazine	21 CFR 556.620 21 CFR 520.2170	Antibacterial
Sulfachloropyrazine monohydrate, sodium	21 CFR 556.625 21 CFR 520.2184	Antibacterial
Sulfachlorpyridazine	21 CFR 556.630 21 CFR 520.2200 21 CFR 522.2200	Antibacterial
Sulfadiazine	21 CFR 520.2611	Antibacterial
Sulfadimethoxine	21 CFR 556.640 21 CFR 520.2220 21 CFR 522.2220 21 CFR 558.575	Antibacterial
Sulfaethoxypyridazine	21 CFR 556.650 21 CFR 520.2240 21 CFR 522.2240 21 CFR 558.579	Antibacterial
Sulfamethazine	21 CFR 556.670 21 CFR 520.2260 21 CFR 522.2260	Antibacterial
Sulfamethoxypyridazine	21 CFR 520.2300	Antibacterial
Sulfanitran	21 CFR 556.680 21 CFR 520.2320 21 CFR 558.376	Antibacterial
Sulfapyridine	none	Antibacterial

LIST OF HISTORICAL COMPOUNDS

COMPOUNDS/ PRODUCTS	REFERENCE	CLASS/USE
Sulfaquinoxaline	21 CFR 520.2325 21 CFR 558.586	Antibacterial
Sulfathiazole	21 CFR 556.690	Antibacterial
Sulfisoxazole	21 CFR 520.2330	Antibacterial
Sulfomycin	21 CFR 556.700 21 CFR 522.2340	Antibacterial
2,4,5-T	none	Herbicide
Tebuthiuron	40 CFR 180.390	Herbicide
Terbacil & metabolites	40 CFR 180.209	Herbicide
Terbufos	40 CFR 180.352	Insecticide
Terbuthylazine	40 CFR 180.333	Herbicide
Terbutryn	40 CFR 180.265	Herbicide
Terpene polychlorinates [Strobane]	none	Insecticide
Testosterone propionate	21 CFR 556.710	Hormone
Tetracycline hydrochloride	21 CFR 556.720 21 CFR 546.180,a,h,i	Antibacterial
Tetradifon	40 CFR 180.174	Insecticide
Thiabendazole & metabolite	21 CFR 556.730 40 CFR 180.242 21 CFR 558.615 21 CFR 520.2380	Anthelmintic
Thiamylal, Sodium	21 CFR 522.2424	Anesthetic
Thidiazuron	40 CFR 180.403	Defoliant
Thiobencarb	40 CFR 180.401	Herbicide
Thiophanate-methyl & oxygen analog	40 CFR 180.371	Anthelmintic

LIST OF HISTORICAL COMPOUNDS

COMPOUNDS/ PRODUCTS	REFERENCE	CLASS/USE
Thiram	40 CFR 180.132	Fungicide
Tiamulin	21 CFR 556.738 21 CFR 520.2455 21 CFR 558.600	Antibacterial
Tilmicosin	21 CFR 556.735 57 FR 12711	Antibacterial
Toxaphene	40 CFR 180.138	Pesticide
Trenbolone Acetate	21 CFR 556.739 21 CFR 522.2476	Feed Efficiency and Weight Gain
Triamcinolone acetonide	21 CFR 520.2482	Anti-inflammatory
Triasulfuron	54 FR 18020	Herbicide
S,S,S-Tributyl phos- phorotrithioate [DEF]	40 CFR 180.272	Defoliant
Trichlorfon	40 CFR 180.198 ¹ 21 CFR 520.1326/2520	Insecticide
Triclopyr & metabolite	40 CFR 180.417	Herbicide
Trifluralin	40 CFR 180.207	Herbicide
Triphenyltin hydroxide	40 CFR 180.236	Fungicide
Tylosin	21 CFR 556.740 21 CFR 520.2640 21 CFR 522.2640 21 CFR 524.2640 21 CFR 558.625	Antibacterial
Virginiamycin	21 CFR 556.750 21 CFR 558.635	Antibacterial
Xylazine	21 CFR 522.2662	Analgesic

¹ As dimethyl (2,2,2-trichloro-1-hydroxyethyl)
phosphonate.

LIST OF HISTORICAL COMPOUNDS

COMPOUNDS/ PRODUCTS	REFERENCE	CLASS/USE
Zeranol & metabolite	21 CFR 556.760 21 CFR 522.2680	Anabolic
Zinc	none	Trace Element
Zinc ion & maneb, coordination product [Mancozeb]	40 CFR 180.176	Fungicide
Zineb	40 CFR 180.115	Fungicide
Zoalene & metabolite	21 CFR 556.770	Coccidiostat

B. COMPOUNDS INCLUDED IN THE NRP PLANS 1972 - 1994¹

AFLATOXINS	1972,1981-1982,1984
ANTIBIOTICS	
Bacitracin	1987-1990
Chloramphenicol	1974-1975,1981-1990
Chlortetracycline	1972-1994
Erythromycin	1972-1994
Gentamicin	1984-1994
Lincomycin	1985-1987,1990
Neomycin	1972-1994
Oxytetracycline	1972-1994
Penicillins ²	1972-1994
Streptomycins ³	1972-1994
Tetracycline	1972-1994
Tylosin	1984-1994
APRAMYCIN	1983-1985, 1987-1990
ARSENICALS⁴	1972-1994
BENZIMIDAZOLES	
Albendazole	1984-1985,1987-1992
Benomyl	1989-1992
Cambendazole	1990
Fenbendazole	1984-1992
Mebendazole	1986-1989
Oxfendazole	1986-1992
Thiabendazole and metabolite	1976-1978,1985-1992
BUQUINOLATE	1975-1976
CADMIUM	1972,1974-1978,1980,1983-1989
CARBADOX	1973-1985,1987-1994
CARBAMATES	
Aldicarb and metabolites	1987-1992
Bufencarb	1988-1990
Carbaryl and metabolites	1987-1992
Carbofuran and metabolites	1987-1992
Methiocarb and metabolites	1989-1990

1. The NRP Includes not only compounds with approved uses in food animals but also environmental contaminants, such as chlordane, and compounds suspected of misuse, such as clenbuterol.

2. Penicillins includes all beta-lactams such as Amoxicillin, Ampicillin, Cloxacillin and Hetacillin.

3. Streptomycins includes dihydrostreptomycin and streptomycin.

4. Arsenicals includes all inorganic or organic forms of arsenic, such as arsanilate, arsenate, and arsenite salts, cacodylic acid, carbarsone, methanearsonic acid and roxarsone.

COMPOUNDS INCLUDED IN THE NRP PLANS 1972 - 1994

CARBARSONE	1972-1994
CHLORINATED HYDROCARBONS AND CHLORINATED ORGANOPHOSPHATES	
Aldrin	1972-1994
BHC	1972-1994
Bromoxymil	1990-1991
Captan	1988-1994
Carbophenothion	1987-1994
Chlordane	1972-1994
Chlordecone (kepone)	1988-1990
2-Chloro-1-(2,4- dichlorophenyl) vinyl diethyl phosphate [Chlorfenvinphos]	1988-1994
2-Chloro-1, (2,4,5- trichlorophenyl) vinyl dimethyl phosphate [Stirofos]	1973-1979, 1984-1994
Chlorpyrifos	1972-1976, 1978, 1980-1994
Coumaphos and oxygen analog 2,4-D	1972-1976, 1978, 1980-1994 1991
DDT and metabolites	1972-1994
Dichlorvos	1972-1976, 1978, 1980- 1983, 1985-1987, 1989, 1991-1994
Dieldrin	1972-1994
Dodecachlorooctahydro- 1,3,4-metheno-2H- cyclobuta (cd) pentalene [Mirex]	1972-1994
Endosulfan	1988-1994
Endrin	1972-1994
HCB	1972-1994
Heptachlor and heptachlor epoxide	1972-1994
Lindane	1972-1994
Linuron	1988-1994
Methoxychlor	1972-1994
Nonachlor	1976-1990
PCB's	1972-1994
Phosalone	1988-1994

COMPOUNDS INCLUDED IN THE NRP PLANS 1972 - 1994

CHLORINATED HYDROCARBONS AND CHLORINATED

ORGANOPHOSPHATES, continued

Ronnel	1972-1976,1978,1980-1994
Silvex	1990-1991
Terpene polychlorinates (Strobane)	1973-1983,1989-1991
Toxaphene	1972-1994
Trichlorfon	1972-1976,1978,1980,1983-1990
Trichlorpyr	1990-1991

CLENBUTEROL

1994

CLOPIDOL

1975,1977-1979,1986

CLORSULON

1986-1989

COBALT

1978, 1980,1983-1986,1988-1989

COPPER

1974-1978, 1980,1983-1989

CRUFOMATE

1972-1976,1978,1980-1990

CYROMAZINE

1984-1990

DECOQUINATE

1975-1976,1983-1984,1986-1988,1990

DIBUTYLTIN DILAURATE

1982,1988-1990

DIETHYLSTILBESTROL

1972-1991

ESTRADIOL

1987-1990

ETHYLENE DIBROMIDE

1983-1985

GENTIAN VIOLET

1990,1993

HALOFUGINONE

1986-1994

IRON

1972-1976,1984-1987

IVERMECTIN

1984-1994

LASALOCID

1983-1985

LEAD

1972,1974-1978,1980,1984-1989

LEVAMISOLE

1976,1978-1979,1984-1986,1993-1994

MANGANESE

1978,1980,1983-1987

MELENGESTROL ACETATE

1978-1983,1987-1990

COMPOUNDS INCLUDED IN THE NRP PLANS 1972 - 1994

MERCURY	1972-1977, 1980,1984,1986
MONENSIN	1974-1978,1980-1985
MORANTEL TARTRATE	1983-1985,1993-1994
NEQUINATE	1975-1976
NICARBAZIN	1989-1991
NICKEL	1978,1980,1983-1987
NITROIMIDAZOLES	
Dimetridazole	1978-1979
Diminazine aceturate	1990-1991
Ipronidazole	1974-1978,1984-1991
NOVOBIOCIN	1985-1990
ORGANOPHOSPHATES (non-chlorinated)	
0,0-Diethyl S-(2-(ethylthio)ethyl) phosphorodithioate	1972-1976,1978,1980-1990
Dioxathion	1972-1976,1978,1980-1981,1984,1986-1990
Diazinon	1978, 1980-1990
Ethion	1972-1976,1978,1980-1983,1985-1989
Fenitrothion	1978, 1980-1983,1985-1987,1989
Fenthion	1972-1976,1978-1983,1985-1989
Malathion	1972-1976,1978,1980-1989
Methyl parathion	1972-1976,1978,1980-1989
Parathion	1972-1976,1978,1980-1989
PBB's	1974, 1982-1983
PENTACHLOROPHENOL	1978,1981-1986, 1991
PYRANTEL TARTRATE	1983-1985,1990-1994
PYRETHRINS	1990-1992
Cyano (3-phenoxyphenyl) methyl-4-chloro-a (methyl-ethyl) benzeneacetate [Fenvalerate]	
Cypermethrin	
Flucythrinate	
Permethrin	
Deltamethrin	1990
ROBENIDINE HYDROCHORIDE	1975-1978
SELENIUM	1978,1984

COMPOUNDS INCLUDED IN THE NRP PLANS 1972 - 1994

SULFONAMIDES

Sulfabromomethazine	1973-1989
Sulfachloropyrazine	1991-1992
Sulfachlorpyridazine	1984-1994
Sulfadiazine	1986-1990
Sulfadimethoxine	1973-1994
Sulfadoxine	1990
Sulfaethoxypryridazine	1984-1994
Sulfamethazine	1973-1994
Sulfamethoxypyridazine	1984-1990
Sulfanitran	1990-1991
Sulfaphenazole	1990
Sulfapyridine	1973-1990
Sulfaquinoxaline	1973-1990
Sulfathiazole	1973-1994
Sulfisoxazole	1990

TIN

1982-1984, 1988-1989

TRIAZINES

1983-1985, 1988-1990

Atrazine
Propazine
Simazine
Terbuthylazine

VIRGINIAMYCIN

1985-1990

ZERANOL AND METABOLITES

1973-1974, 1977, 1985-1989

ZINC

1974-1978, 1980, 1983-1987

Section 4

FSIS Residue Analytical Capability



FSIS RESIDUE ANALYTICAL CAPABILITY

INTRODUCTION

The Food Safety and Inspection Service (FSIS) requires practical analytical methods for detecting, quantifying, and identifying residues that may be present in meat, poultry, and their processed products at levels above established safe residue limits. These methods can be used by the Agency for monitoring and surveillance activities to determine whether product is adulterated. The Agency uses available methodology to take appropriate regulatory action against adulterated products, consistent with the reliability of the analytical data. However, because of the large number of potential residues that may occur in the food chain, practical methods are not available for many compounds of interest. This section describes the types of methods used by FSIS to conduct analyses and their suitability for regulatory use. A list of key terms precedes the method descriptions. The chemical method descriptions, with some few exceptions, are referenced to the latest edition of the FSIS Analytical Chemistry Laboratory Guidebook.

A. CRITERIA FOR PRACTICAL METHODS

The following criteria have been identified as primary concerns for methods suitable for regulatory use.

1. The method requires no more than 2-4 hours of analytical time per sample.
2. A quality assurance plan has been developed for the method.

B. KEY TERMS

AAS -- Atomic Absorption Spectrometry.

AOAC -- Association of Official Analytical Chemists.

CELIA CA -- Competitive Enzyme Labeled Immunoassay for Chloramphenicol: a laboratory test that detects and identifies chloramphenicol residues in cattle and pork muscle.

CI -- Chemical ionization.

ECD -- Electron capture detector.

EI -- Electron impact.

ELISA -- Enzyme-linked immuno sorbent assay.

E-Z SCREEN -- A proprietary immunoassay system for rapid detecton and identification of various antibiotics and other residues in tissue extracts.

GC -- Gas chromatography.

GLC -- Gas liquid chromatography.

GPC -- Gel permeation chromatography.

HFAA -- Heptafluorobutyric acid anhydride.

HPLC -- High pressure liquid chromatography.

JAOAC -- Journal of the Association of Official Analytical Chemists.

J. FOOD PROT. -- Journal of Food Protection.

LDL -- Lowest detectable limit. The smallest amount of individual residue or sample component that can be reliably observed or found in the sample matrix by the current appropriate methodology.

MIC -- Minimum inhibitory concentration: the minimum amount of antimicrobial compound present in a buffer extract of tissue that will inhibit bacterial growth in a cell culture media.

KEY TERMS (continued)

MPL -- Minimum proficiency level: the minimum amount of analyte expected to be identified and quantified by a laboratory and upon which ongoing capability will be evaluated. It is the smallest concentration for which the predicted coefficient of variance for reproducibility (CV) is less than or equal to 20 percent and the upper 90 percent confidence level for the predicted CV is less than 30 percent.

MS -- Mass spectrometry.

NADA -- New Animal Drug Application, issued by the Center for Veterinary Medicine Food and Drug Administration (FDA).

NE -- Level not established.

NICI -- Negative ion chemical ionization.

PICI -- Positive ion chemical ionization.

PP -- Processed product.

QUANTIFICATION -- The determination of the amount of residue present in a sample.

REFERENCE METHODS -- Analytical procedures by which other methods may be evaluated and for which standards are established. These methods are considered suitable for regulatory use in the National Residue Program.

RESIDUE -- Any compound present in edible tissues or the target tissue of the animal that results from that compound's use or inadvertent introduction into the animal. "Residue" includes the compound itself, its metabolite, and other substances formed in, or on, food because of the compound's use or inadvertent introduction.

SOS -- Sulfa-on-Site: a rapid in-plant chemical screening test for detecting residues in food animal urine or serum that provides same-day results.

STOP -- Swab Test on Premises: an overnight in-plant laboratory microbiological screen test for detecting antibiotic residues in edible tissues.

SWAB -- STOP precursor: an overnight laboratory microbiological screen test for detecting antibiotic residues in edible tissues.

TLC -- Thin layer chromatography.

UV -- Ultraviolet spectrophotometric techniques for detection and quantification.

C. FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES TISSUES	REF
		LDL/ MIC	MPL		
Albendazole (amino sulfone metabolite)	Marker residue detected and quantified by HPLC fluores- cence detection.	20 ppb	50 ppb	Cattle/liver Cattle/muscle Sheep/muscle	1
	Extraction with organic solvents followed by HPLC- with UV detection; extracts confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ liver, muscle	1
Aldicarb and metabolites	GPC plus HPLC with post-column fluorescence detection; extracts verified by oxidation to the sulfone.	5 ppb	10 ppb	All liver	1
Aldrin	Micro alumina assay: column chromatography plus GLC.	0.2 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.02 ppm	0.05 ppm	All/fat, PP	1
	Mills method: Florisil column chromatography plus GLC.	0.02 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills confirmed by GC/MS.	0.03 ppm	NE	All/fat, PP	1
Amoxicillin trihydrate	Microbiological assay procedure: ability of tissue extracts containing anti- microbial activity to inhibit microbial growth.	0.02 ppm	0.02 ppm	Cattle, Swine/ kidney, liver, muscle	2
	Tissue extracts quanti- fied by HPLC using fluorometer.	0.01 ppm	0.01 ppm	Cattle, Swine/ kidney, liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

TEST METHOD

COMPOUND	METHOD DESCRIPTION	LDL/ MIC	MPL	SPECIES/ TISSUES	REF.
Ampicillin	Microbiological assay procedure: ability of tissue extracts containing anti-microbial activity to inhibit growth.	0.01 ppm	0.01 ppm	Cattle, Swine/all	3
Ampicillin trihydrate					
Apramycin	Sample extraction TLC; bioautographed using Bacillus subtilis as a test organism.	0.05 ppm	0.10 ppm	Swine/kidney, muscle	1
Arsenic Arsanilic Acid and Salts Arsenate Salts Arsenite Salts	Dry ashed tissue dissolved and reacted to produce arsine gas, which is quantified by AAS.	0.15 ppm	NE	All/kidney, liver, muscle	1
	Dry ashed tissue dissolved and reacted to arsine gas, which reacts to form blue complex for colorimetric quantification.	0.05 ppm	0.20 ppm	All/kidney, liver, muscle	1
Atrazine	Fat extracted using C18 columns and quantified by capillary GC with nitrogen/phosphorous detector.	5 ppb	NE	All/fat	1
	Extracts confirmed by GC/MS.	5 ppb	NE	All/fat	1
Bacitracin methylene disalicylate	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.05 ppm	NE	All/kidney	4
Bacitracin, Zinc					

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES TISSUES	REF.
		LDL/ MIC	MPL		
Bambermycins	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	25 ppb	NE	All/kidney, liver, muscle	5
Bendiocarb	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1
Benomyl	pH extraction with organic solvents; followed by HPLC with UV detection; extracts derivatized and confirmed by GC/EI/MS.	0.05 ppm	NE	Poultry/ liver, muscle	1
BHC	Micro alumina assay: column chromatography plus GLC.	0.01 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.01 ppm	0.05 ppm	All/fat	1
	Beta and delta isomers: GPC plus GLC.	0.02 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.02 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills confirmed by GC/MS.	0.02 ppm	NE	All/fat, PP	1
Bufencarb	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1

FSIS RESIDUE ANALYTICAL CAPABILITY

TEST METHOD

COMPOUND	METHOD DESCRIPTION	LDL/ MIC	MPL	SPECIES TISSUES	REF.
Cacodylic acid	Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification.	0.05 ppm	0.20 ppm	All/kidney, liver, muscle	6
Cadmium	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma	0.5 ppb 4 ppb	NE NE	All/kidney, liver, muscle	1
	Dry ashed tissue is quantified by anodic stripping voltammetry.	1.0 ppb	NE	Poultry/ kidney, liver	7
Calcium	Tissue is wet ashed, titrated with specific indicator.	0.03%	0.03%	All/muscle	8
	Wet ashed tissue is quantified by AAS.	NE	NE	All	1
Cambendazole	Extraction with organic solvents followed by HPLC with UV detection; extracts confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ liver, muscle, PP	1
Captan	GPC plus GLC.	0.02 ppm	0.05 ppm	Red meat/fat	1
Carbadox	Tissue extract is hydrolyzed and a derivative is prepared and separated.	7.5 ppb	30 ppb	Swine/ liver, muscle	1
	Extracts confirmed by GC/EI/MS.	7.5 ppb	NE	Swine/liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Carbarsone	Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification.	0.05 ppm	0.20 ppm	All/kidney, liver, muscle	9
Carbaryl	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1
Carbofuran and metabolite	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1
Carbophenothion	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector. GPC plus GLC.	0.10 ppm	NE	All/liver muscle	1
	GPC extracts are confirmed by CG/EI/MS.	0.03 ppm	0.20 ppm	All/fat	1
		0.01 ppm	NE	Red meat/fat	1
Chloramphenicol	Tissue extracts are screened by E-Z screen. Tissue extract screened for chloramphenicol by CELIA CA.	25 ppb	NE	Calf/muscle, kidney	10
		5 ppb	NE	Calf/muscle	11

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Chloramphenicol continued	Extraction of parent and glucuronide using C18 columns with GC capillary quantification as the trimethylsilyl derivative.	0.15 ppb	NE	Calf/muscle	1
	Extracts are confirmed using NICI/MS.	0.15 ppb	NE	Calf/muscle	1
	C18 cleanup of the with GC capillary quantification as the trimethylsilyl derivative.	5 ppb	NE	Calf/urine	1
	Extracts are confirmed using NICI/MS.	5 ppb	NE	Calf/urine	1
Chlordane	Micro alumina assay: column chromatography plus GLC.	0.15 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.10 ppm	0.30 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.15 ppm	0.30 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.10 ppm	NE	All/fat, PP	1
Chlordecone (Kepone)	GPC plus GLC.	0.03 ppm	0.20 ppm	All/fat	1
	GPC extracts are confirmed by GC/EI/MS.	0.05 ppm (poultry) 0.20 ppm (cattle)	NE	Poultry, Red meat/fat	1
2-Chloro-1-(2,4-di-chlorophenyl) vinyl diethyl phosphate (Chlorfenvinphos)	GPC plus GLC.	0.03 ppm	0.10 ppm	Cattle, Sheep/fat	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
2-Chloro-1-(2,4-dichlorophenyl) vinyl diethyl phosphate, continued	GPC extracts are confirmed by GC/EI/MS.	0.01 ppm (poultry) 0.10 ppm (red meat)	NE	Poultry, Red meat/fat	1
2-Chloro-1 (2,4,5-tri-vinyl dimethyl phosphate (Stiophos)	GPC plus GLC.	0.05 ppm	0.30 ppm	All/fat	1
	GPC extracts are confirmed by GC/EI/MS.	0.05 ppm (poultry) 0.10 ppm (cattle)	NE	Poultry, Red meat/fat	1
Chlorpyrifos	GPC plus GLC.	0.05 ppm	0.20 ppm	All/fat	1
	GPC extracts are confirmed by GC/EI/MS.	0.02 ppm (poultry) 0.10 ppm (cattle)	NE	Poultry, Red meat/fat	1
Chlortetracycline	Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth.	0.01 ppm	NE	All/kidney	12
	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.01 ppm	NE	All/kidney, liver, muscle	13
	Extraction using C18 columns followed by HPLC with UV detection.	0.15 ppm	0.25 ppm	All/kidney, liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Chromium	Dry ashed tissue is extracted with organic reagent and quantified using AAS.	NE	NE	All/kidney, liver, muscle	1
Clopidol	Organic solvent extraction with HPLC-UV detection.	0.1 ppm	NE	Poultry/liver	15
	Organic solvent extraction with GC-EC detection.	0.1 ppm	NE	Poultry/liver	1
Clorsulon	Tissue extracts are quantified by HPLC-UV detection.	0.25 ppm	0.50 ppm	Red meat/kidney, muscle liver, PP	1
	Tissue extracts for and confirmed by GC/MS.	0.5 ppm	NE	Red meat/kidney, muscle, liver, PP	1
Cloxacillin	Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth.	0.16 ppm	NE	All/kidney	16
	Microbiological assay combined with HPLC separation and quantified by microbial inhibition.	0.02 ppm	NE	Dairy cows/kidney, liver, muscle	17
Cobalt	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	6 ppb	NE	All/kidney, liver, muscle	1
		6 ppb	NE	All/kidney, liver, muscle	

RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Copper	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	1 ppb	NE	All/kidney, liver,muscle	1
		3 ppb	NE	All/kidney, liver, muscle	
Coumaphos and oxygen analog	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1
	GPC plus GLC.	0.15 ppm	0.30 ppm	All/fat	1
	GPC extracts are confirmed by CG/EI/MS.	0.20 ppm	0.30 ppm	Red meat/ fat	1
Cresylic acid	Tissue extracts are derivatized and determined by GC-EC.	NE	NE	Poultry/fat	1
Cruformate (Ruelene)	Tissue extracts are quantified by GLC with flame photo-metric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1
Cyanide salts	Aqueous extraction followed by a colorimetric determination.	0.5 ppm	NE	All/all	1
	For confirmation, cyanogen chloride is produced and determined by GC/EC.	0.5 ppm	NE	All/all	1
Cyano (3- phenoxy- chlorophenyl) methyl- 4-a (methylethyl) benzeneacetate (Fenvalerate)	Organic solvent extracts are quantified as the sum of both isomers by GC/EC; extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	All/fat	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Cypermethrin	Organic solvent extracts are quantified as the sum of three isomers by GC/EC; extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	All/fat	1
	Solvent extraction followed by a competitive ELISA determination.	0.5 ppm	NE	All/fat	1
Cyromazine and metabolite (Melamine)	Tissue extracts are quantified by HPLC-UV detection.	0.05 ppm	0.25 ppm	Poultry, red meat/ muscle, PP	1
	Extracts are used to confirm cyromazine and melamine residues by GC/EI/MS using polymethylsilyl derivative.	0.05 ppm	NE	All/muscle	14
DDE (metabolites of DDT collectively reported as DDT)	Micro alumina assay: column chromatography plus GLC.	0.02 ppm	NE	All/fat, PP	1
	GPL plus GLC.	0.02 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.02 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.02 ppm	NE	All/fat, PP	1
DDT (isomers of DDT collectively reported as DDT)	Micro alumina assay: column chromatography plus GLC.	0.04 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.04 ppm	0.15 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.04 ppm	0.15 ppm	All/fat, PP	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Decoquate	Zymark Pytechnology System; organic solvent extraction followed by HPLC with fluorescence detection.	0.20 ppm	0.5 ppm	Cattle, Poultry/ liver, muscle	14
Deltamethrin	Organic solvent extracts are quantified by GC/EC.	0.025 ppm	NE	All/fat	1
	Solvent extraction followed by a competitive ELISA determination.	0.5 ppm	NE	All/fat	1
Diazinon	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.1 ppm	NE	All/liver, muscle	1
Dibutyltin dilaurate (Butynorate)	Tissue extraction acid-hydrolysis--morin derivatization--HPLC-UV.	0.25 ppm	NE	Turkey/ liver	1
Dieldrin	Micro alumina assay: column chromatography plus GLC.	0.01 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.01	0.05	All/fat	1
	Mills Method: Florisil column chromatography.	0.01 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.02 ppm	NE	All/fat, PP	1

FSIS ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD			
		MIC	LDL/ MPL	SPECIES/ TISSUES	REF.
Diethylstilbestrol (DES)	Solid phase extraction technique using an internal standard followed by methylsilation for GC/MS quantification and confirmation.	0.1 ppb	0.2 ppb	Cattle, Sheep/ liver, muscle	1
Dihydrostreptomycin	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney	12
	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney, liver, muscle	18
3,5-dimethyl-4-(methylthio) phenyl methylcarbamate and metabolite (Methiocarb)	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1
Dimetridazole and hydroxy metabolite	Extracts are quantified by HPLC/UV.	1.0 ppb	NE	Turkey, Swine/ muscle	14
	Tissue extracts from HPLC are confirmed by GC/NICI/MS.	1.0 ppb	NE	Turkey, Swine/ muscle	14
Dioxacarb	GPC plus HPLC with post-column fluorescence detection.	5 ppb	10 ppb	All/liver	1
	Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.				
Dioxathion	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Dodecachloro-octahydro-1,3,4-metheno-2H-cyclobuta(cd)-pentalene (Mirex)	Micro alumina assay: column chromatography plus GLC.	0.04 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.04 ppm	0.10 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.04 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.05 ppm	NE	All/fat, PP	1
Endosulfan I	GPC plus GLC.	0.01 ppm	0.10 ppm	All/fat	1
	GPC extracts are confirmed by GC/EI/MS.	0.02 ppm	NE	Red meat/fat	1
Endosulfan II	GPC plus GLC.	0.02 ppm	0.20 ppm	All/fat	1
Endrin	Micro alumina assay: column chromatography plus GLC.	0.03 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.03 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.03 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.05 ppm	NE	All/fat, PP	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD			REF.
		LDL/ MIC	MPL	SPECIES/ TISSUES	
Erythromycin	Antibiotic screen test (Swab): ability of tissue fluids containing antimicrobial activity to inhibit microbial growth.	25 ppb	NE	All/kidney	12
	Microbiological assay procedure: ability of tissue fluids containing antimicrobial activity to inhibit microbial growth.	25 ppb	NE	All/kidney, liver, muscle	19
Ethion and oxygen analog	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1
Ethylene dibromide	Residue is co-distilled from aqueous suspension and quantified by GLC.	0.5 ppb	1.0 ppb	All/fat	1
	MS by NICI to determine bromine.	1 ppb	NE	All/fat	1
Fenbendazole	Extraction with organic HPLC with UV detection; extracts derivatized and confirmed by GC/EI/MS.	0.10	NE	Red meat/	1
	Tissue extracts are quantified by HPLC.	200 ppb	400 ppb	Cattle, Calf/liver	20
	Quantification of extract purified by TLC, derivatized and identified by HPLC fluorescence.	200 ppb	NE	Cattle, Calf/liver	20
Fenitrothion	Tissue extracts are flame photometric or nitrogen-phosphorous flame ionization detector.	0.10	NE	All/liver,	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD			REF.
		LDL/ MIC	MPL	SPECIES/ TISSUES	
Fenpropathrin	Solvent extraction followed by competitive ELISA determination.	1.0 ppm	NE	All/fat	14
Flucythrinate	Organic solvent extracts are quantified as the sum of both isomers by GC/EC; extracts are confirmed by GC/EI/MS.	1.0 ppm	NE	All/fat	1
	Solvent extraction followed by a competitive ELISA determination.	1.0 ppm	NE	All/fat	1
Gasoline	Fat from product is heated in a sealed vial and gasoline components are identified by pattern recognition using GC/flame ionization detection.	0.1 ppm	NE	All/muscle	1
Gentamicin sulfate	Tissue extracts are screened by E-Z Screen.	50 ppb	NE	All/muscle, liver, kidney	21
	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	NE	NE	Swine/kidney	22
	Extraction followed by detection by HPLC with fluorescence detector.	0.2 ppm	0.4 ppm	Swine/kidney	1
Halofuginone	Tissue extracts are quantified by HPLC-UV.	0.05 ppm	0.05 ppm	Chicken/liver, muscle	1
	Tissue extracts are confirmed by GC/MS/MS.	0.05 ppm	NE	Chicken/liver, muscle	23

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Hexachlorobenzene (HCB)	Micro alumina assay: column chromatography plus GLC.	0.01 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.01 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.01 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.01 ppm	NE	All/fat, PP	1
Heptachlor and heptachlor epoxide	Micro alumina assay: column chromatography plus GLC.	0.01 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.01 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.01 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills or confirmed by GC/MS.	0.02 ppm	NE	All/fat, PP	1
Hetacillin, Potassium	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	NE	NE	All/kidney	16
5-Hydroxy-thiabendazole	Extraction with organic solvents followed by HPLC with UV detection; extracts confirmed by derivatized GC/EI/MS.	0.05 ppm	NE	Red meat/ liver, muscle	14
Hygromycin B	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	5.00 ppm	NE	All/kidney	16

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Iprnidazole and hydroxy metabolite	Tissue extracts are quantified by HPLC/UV.	1.0 ppb	NE	Turkey,swine/ muscle	14
	Tissue extracts from HPLC are confirmed by GC/NICI/MS.	1.0 ppb	NE	Turkey,swine/ muscle	14
Iron	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	3.0 ppb	NE	All/kidney, liver, muscle	1
Ivermectin	Tissue extracts are quantified by HPLC fluorescence.	2.0 ppb	5.0 ppb	Red meat/ liver, muscle	1
	Derivatization to form 3 components with detection by HPLC fluorescence.	2.0 ppb	NE	Red meat. liver, muscle	1
Lasalocid	Tissue extracts are quantified by HPLC fluorescence detector.	0.025 ppm	0.35 ppm	Cattle/liver; Poultry/fat, skin	1
	Tissue extraction followed by bio- autography.	0.005 ppm	0.01 ppm	Poultry/ fat, skin	24
	GC pyrolysis of the extract with MS identification of the fragments.	0.2 ppm	NE	Cattle/liver; Poultry/fat, skin	24
Lead	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	0.01 ppm	NE	All/kidney liver, muscle	1
		0.05 ppm	NE		
	Dry ashed tissue is quantified by anodic stripping voltammetry.	1.0 ppb	NE	Poultry/ kidney, liver	7

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Levamisole	Tissue extracts are quantified by GLC flame photometric detection.	0.05 ppm	NE	All/fat, liver, muscle	1
	Tissue extracts are subjected to GC/MS.	0.05 ppm	NE	Red meat/ liver, muscle	1
Lincomycin hydrochloride	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.10 ppm	0.10 ppm	Poultry, swine/all	25
Lindane	Micro alumina assay: column chromatography plus GLC.	0.01 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.01 ppm	0.05 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.10 ppm	0.10 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.01 ppm	NE	All/fat, PP	1
Linuron	GPC plus GLC.	0.25 ppm	0.50 ppm	All/fat	1
	Extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ fat	1
Lysergic acid diethylamide	Tissue extracts are spotted for TLC and detected with specific chromogenic reagent.	NE	NE	All/kidney, liver, muscle, PP	1
Malathion	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	LDL/ MIC	TEST METHOD		
			MPL	SPECIES/ TISSUES	REF.
Manganese	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	0.001 ppm	NE	All/kidney liver, muscle	1
		0.001 ppm	NE		
Mebendazole	Extraction with organic solvents followed by HPLC with UV detection; extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/liver, muscle	1
Melengestrol acetate (MGA)	Tissue extract is column chromatographed on Florisil and quantified by GLC.	5.0 ppb	10.0 ppb	Cattle/liver muscle kidney, fat	1
	Extracts are derivatized with HFAA and confirmed by GC/EI/MS.	5.0 ppb	10.0 ppb	Cattle/fat	1
Mercury	Tissue is digested in acid. Mercury is reduced to its vapor and quantified by flameless AAS.	0.02 ppb	0.02 ppb	All/kidney, liver, muscle	1
Methanearsonic acid	Dry ashed tissue is dissolved and reacted to produce arsine gas, which is quantified by AAS.	0.05 ppm	NE	All/kidney, liver, muscle	1
	Dry ashed tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification.	0.05 ppm	0.20 ppm	All/kidney, liver, muscle	1
Methomyl	GPC plus HPLC with post-column fluorescence.	5 ppb	10 ppb	All/liver	1

FSIS RESIDUE ANALYTICAL CAPABILITY

TEST METHOD

COMPOUND	METHOD DESCRIPTION	LDL/ MIC	MPL	SPECIES/ TISSUES	REF.
Methoxychlor	Micro alumina assay: column chromatography plus GLC.	0.15 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.15 ppm	0.50 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.15 ppm	0.50 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.15 ppm	NE	All/fat, PP	1
Methyl parathion	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	0.10 ppm	NE	All/liver, muscle	1
Monensin	Tissue extract is partitioned by TLC and semi-quantified by inhibition of micro- bial growth.	0.05 ppm	0.10 ppm	Cattle, Poultry/ liver, fat	1
Morantel tartrate	Tissue extract is hydro- lyzed and a derivative is quantified by GLC.	0.25 ppm	0.50 ppm	Cattle/ liver	1
		0.50 ppm	NE	Cattle/ muscle	1
	Identification of a structurally significant hydrolyzed fragment by GC/MS.	0.25 ppm	NE	Cattle/ liver, muscle	26
Narasin	Tissue extracts are spotted on TLC and quantified with a bioautographic overlay.	5.0 ppb	NE	Cattle, Poultry/ liver, kidney, fat	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Neomycin	Tissue is deproteinized, acidified, and extracted; quantified by HPLC/UV.	1.5 ppm	NE	All/kidney	14
	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney	16
	Tissue extracts are screened by E-Z Screen.	5.0 ppb	NE	All/muscle, liver, kidney	10
	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney, liver, muscle	27
Nequinat	Zymark Pytechnology System: Tissue extracts are screened by HPLC/UV.	NE	NE	Cattle/ liver, muscle	14
Nicarbazin	Tissues are extracted with ethyl acetate: the dinitrocarbanilide moiety is quantified by HPLC with a UV detector. Extracts verified by photodiode array detection.	0.1 ppm	2.0 ppm	Chicken/ all tissues	1
Nickel	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	0.004 ppm	NE	All/kidney, liver, muscle,	1
		0.01 ppm	NE		
Nonachlor	Micro alumina assay: column chromatography plus GLC.	0.05 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.03 ppm	0.15 ppm	All/fat	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Nonachlor continued	Mills method: Florisil column chromatography plus GLC.	0.05 ppm	0.15 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.05 ppm	NE	All/fat, PP	1
Novobiocin	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.125 ppm	NE	All/kidney, liver, muscle	4
	Zymark Pytechnology System: organic solvent extraction followed by HPLC/UV detection.	0.50 ppm	NE	All/kidney, liver, muscle	14
	Manual system organic solvent extraction followed by HPLC/UV detection.	0.50 ppm	1.0 ppm	All/kidney, liver, muscle	1
Oleandomycin	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney	16
Oxfendazole	Extraction with organic solvent followed by HPLC with UV detection; extracts are derivatized and confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ PP, liver, muscle	1
Oxytetracycline hydrochloride	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.08 ppm	NE	All/kidney	16
	Microbiological assay procedure: ability of tissue extracts containing antimicrobial activity to inhibit microbial growth.	0.08 ppm	0.08 ppm	All/kidney, liver, muscle	28

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Oxytetracycline hydrochloride continued	Extraction using C18 columns followed by HPLC with UV detection.	0.15 ppm	0.25 ppm	All/kidney, liver, muscle	14
Parathion	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	NE	NE	All/liver, muscle	14
PBB's	Micro alumina assay: column chromatography plus GLC detection by electron capture. UV degradation of PBB's is used as confirmation.	0.05 ppm	NE	All/fat	29
	GPC plus GLC/ECD followed by GC/MS.	NE	NE	All/fat	29
PCB's (reported as Aroclor 1242, 1248, 1254, 1260, etc.)	Micro alumina assay: column chromatography plus GLC.	0.30 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.30 ppm	0.50 ppm	All/fat	1
Penicillin, procaine and procaine G	Antibiotic screen test (Swab): ability of tissue fluids containing anti- microbial activity to inhibit microbial growth.	12.5 ppb	NE	All/kidney	16
Penicillin G (benzathine, free acid, sodium salt and procaine salts	Microbiological assay pro- cedure: ability of tissue extracts containing anti- microbial activity to inhibit microbial growth.	12.5 ppb	NE	All/kidney, liver, muscle	30

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Pentachloro- anisole	GPC plus GC.	NE	NE	Poultry/fat	1
	Extracts confirmed by GC/EI/MS.	NE	NE	Poultry/fat	14
Pentachloro- phenol	Tissue digestate is extracted with cyclohexane and quantified by GLC.	0.025 ppm	0.050 ppm	All/liver, muscle	1
	Tissue extracts for GLC are confirmed by GC/MS.	0.03 ppm	NE	All/liver, muscle	1
	Extracts confirmed by GC/EI/MS.	NE	NE	Poultry/fat	1
Permethrin (cis & trans)	Solvent extraction followed by a competitive ELISA determination.	25 ppb	NE	All/fat	1
	Organic solvent extracts are quantified as the sum of both isomers; extracts are confirmed by GC/EI/MS.	10 ppb	NE	All/fat	1
Phencyclidine	Tissue extracts are spotted for TLC with specific chromogenic agent.	NE	NE	All/liver, muscle	1
Phenothrin	Solvent extraction followed by a competitive ELISA determination.	0.025 ppm	NE	All/fat	1
Phosalone	GPC plus GLC.	0.01 ppm	0.05 ppm	All/fat	1
	GPC extracts are confirmed by GC/EI/MS.	0.02 ppm	NE	Red meat/fat	1
Promecarb	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Propazine	Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous flame ionization detector.	5 ppb	NE	All/fat	1
	Extracts confirmed by GC/MS.	5 ppb	NE	All/fat	1
Propoxur	GPC plus HPLC with post-column fluorescence detection. Extracts are subjected to reverse phase chromatography, derivatized, and confirmed by GC/MS.	5 ppb	10 ppb	All/liver	1
Pyrantel tartrate	Tissue extract is hydrolyzed and a derivative is quantified by GLC.	0.25 ppm	0.50 ppm	Swine/ liver, muscle	1
	Identification of a structurally significant hydrolyzed fragment by GC/MS.	0.25 ppm	NE	Swine/ liver, muscle	31
Ronnel	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	NE	NE	All/liver, muscle	14
	GPC plus GLC.	0.02 ppm	0.05 ppm	All/fat	1
	Extracts are confirmed by GC/EI/MS.	0.01 ppm (poultry)	NE	Poultry, Red meat/ fat	1
		0.10 ppm (red meat)	NE		
Roxarsone	Dry ashed tissue is dissolved and reacted to produce arsine gas, which is quantified by AAS.	0.1 ppm	NE	All/kidney, liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Roxarsone continued	Dry ash tissue is dissolved and reacted to produce arsine gas, which reacts to form blue complex for colorimetric quantification.	0.05 ppm	0.20 ppm	All/kidney, liver, muscle	1
Simazine	Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous detector.	5.0 ppb	NE	All/fat	1
	Extracts confirmed by GC/MS.	5.0 ppb	NE	All/fat	1
Spectinomycin hydrochloride	Microbiological assay: tissue extracts are quantified using a turbidimetric assay.	2.8 ppm	NE	All/kidney, liver, muscle	32
Streptomycin	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney	16
	Microbiological assay procedure: ability of tissue extracts containing anti-microbial activity to inhibit microbial growth.	0.25 ppm	NE	All/kidney, liver, muscle	33
Styrene	Tissues are subjected to GC/MS head space analysis.	1.0 ppm	NE	All/kidney, liver, muscle, fat ,PP	1
Sulfachloro-pyridazine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	Red meat/ liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Sulfadiazine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	Red meat/ liver, muscle	1
	Extraction followed by GC/CI and EI/MS.	0.05 ppm	NE	Red meat/ liver, muscle	1
Sulfadimethoxine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	All/liver, muscle	1
	Extraction followed by GC/EI/MS.	0.05 ppm	NE	All/liver, muscle	1
	Tissue extracts are screened by E-Z Screen.	50 ppb	NE	All/liver	10
Sulfadoxine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.05 ppm	NE	Red meat/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	NE	NE	Red meat/ liver, muscle	1
Sulfaethoxy-pyridazine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	Red meat/ liver, muscle	1
Sulfamethazine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	All/liver, muscle; Red meat/feed concentrate, PP	1
	Tissue extracts are confirmed by GC/EI//MS.	0.05 ppm	NE	All/liver, muscle, PP	1
	Tissue extracts are detected by TLC fluorescence (SOS -urine).	NE	NE	Swine/ urine	14
	Tissue extracts are screened by E-Z Screen.	50 ppb	NE	All/liver	10

FSIS RESIDUE ANALYTICAL CAPABILITY

TEST METHOD

COMPOUND	METHOD DESCRIPTION	LDL/ MIC	MPL	SPECIES/ TISSUES	REF.
Sulfamethoxy- pyridazine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	Red meat/ liver, muscle	1
Sulfaphenazole	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.05 ppm	NE	Red meat/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	NE	NE	Red meat/ liver, muscle	1
Sulfapyridine	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	All/liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	All/liver muscle, PP	1
Sulfaquin- oxaline	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	12.5 ppb	25.0 ppb	Poultry/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	25 ppb	NE	Poultry/ liver, muscle	1
Sulfathiazole	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.02 ppm	0.05 ppm	Red meat/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ liver, muscle, PP	1
Sulfatroxazole	TLC fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.05 ppm	NE	Red meat/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	NE	NE	Red meat/ liver, muscle	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Sulfisoxazole	Tissue fluorescence: tissue extracts are partitioned by TLC and quantified by densitometry.	0.05 ppm	NE	Red meat/ liver, muscle	1
	Tissue extracts are confirmed by GC/EI/MS.	NE	NE	Red meat/ liver, muscle	1
Tetramethrin	Solvent extraction followed by a competitive ELISA determination.	1.0 ppm	NE	All/fat	1
TDE (metabolite of DDT reported as DDT)	Micro alumina assay: column chromatography plus GLC.	0.04 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.03 ppm	0.15 ppm	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.04 ppm	0.15 ppm	All/fat, PP	1
	Extracts from GPC or Mills are confirmed by GC/MS.	0.02 ppm	NE	All/fat, PP	1
Terbuthylazine	Fat extracted using C18 columns and quantified by capillary GC with nitrogen-phosphorous detector.	5.0 ppb	NE	All/fat	1
	Extracts confirmed by GC/MS.	5.0 ppb	NE	All/fat	1
Terpene polychlorinates	Micro alumina assay: column chromatography plus GLC.	0.50 ppm	NE	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.50 ppm	NE	All/fat	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Tetracycline hydrochloride	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.08 ppm	NE	All/kidney	16
	Microbiological assay procedure: ability of tissue extracts containing anti-microbial activity to inhibit microbial growth.	0.08 ppm	NE	All/kidney, liver, muscle	34
	Extraction using C18 columns followed by HPLC with UV detection.	NE	NE	All/kidney, liver, muscle	14
Thiabendazole	pH extraction with organic solvents followed by HPLC with UV detection; extracts derivatized and confirmed by GC/EI/MS.	0.05 ppm	NE	Red meat/ PP liver, muscle	1
Tiamulin	Organic solvent extraction followed by GC of the 8-hydroxymutilin metabolite.	0.2 ppm	0.4 ppm	Swine/liver	35
	Extracts confirmed by GC/EI/MS.	NE	0.4 ppm	Swine/liver	35
Tin	Tissue is dry ashed and dissolved and quantified by AAS (used to screen for organotin compounds).	0.05 ppm	NE	All/kidney, liver, muscle	1
Toxaphene	Micro alumina assay: column chromatography plus GLC.	0.50 ppm	NE	All/fat, PP	1
	GPC plus GLC.	0.50 ppm	NE	All/fat	1
	Mills method: Florisil column chromatography plus GLC.	0.50 ppm	1.00 ppm	All/fat, PP	1

FSIS RESIDUE ANALYTICAL CAPABILITY

COMPOUND	METHOD DESCRIPTION	TEST METHOD		SPECIES/ TISSUES	REF.
		LDL/ MIC	MPL		
Trichlorfon	Tissue extracts are quantified by GLC with flame photometric or nitrogen-phosphorous flame ionization detector.	NE	NE	All/liver, muscle	1
Tylosin	Antibiotic screen test (Swab): ability of tissue fluids containing anti-microbial activity to inhibit microbial growth.	0.20 ppm	NE	All/kidney	16
	Tissue extracts are screened by E-Z Screen.	50 ppm	NE	All/muscle, liver, muscle	10
	Liquid-liquid extraction followed by HPLC-UV detection.	0.1 ppm	NE	Cattle/muscle	14
Virginiamycin	Microbiological assay procedure: ability of tissue extracts containing anti-microbial activity to inhibit microbial growth.	0.64 ppm	NE	Swine/kidney, muscle	36
	Organic solvent extraction followed by HPLC/UV quantification.	0.1 ppm	0.2 ppm	All/kidney, liver, muscle	1
Zeranol and metabolite, taleranol	Extraction followed by radioimmunoassay.	1.0 ppb	NE	Cattle, liver, muscle	1
	Solid phase extraction using an internal standard followed by polymethylsilation for GM/MS quantification and confirmation.	1.0 ppb (zeranol) 4.0 ppb (taleranol)	NE	Cattle, Sheep/liver, muscle	1
Zinc	Dry ashed tissue is dissolved and quantified by AAS or by inductively coupled plasma.	1 ppb	NE	All/kidney, liver, muscle	1
		2 ppb	NE	All/kidney, liver, muscle	

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 **Residue Limits**

 **Compound Ranking**

 **Historical List of Compounds for the
National Residue Program (NRP)**

 **FSIS Residue Analytical Capability**

